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AUTHOR Mattox, Daniel V., Jr.
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ABSTRACT

Research compared conventional and experimental methods of instruction in a teacher education media course. The conventional method relied upon factual presentations to heterogeneous groups, while the experimental utilized homogeneous clusters of students and stressed individualized instruction. A pretest-posttest, experimental-control group design was employed with science, humanities and social science teaching majors. Attitude scales and achievement tests measured the relationships of values and performances to majors, and interaction analysis investigated the implementation of methods and their differences. Among the major results were the findings that: 1) the experimental treatment induced more attitude change; 2) humanities majors had aesthetic values, scientists theoretical ones, and social scientists political values; 3) values correlated poorly with achievement and attitudes; 4) attitude and achievement scores correlated poorly; and 5) the experimental method produced effective textbook learning. It was concluded that the experimental method was as valid as conventional instruction. (Author/PB)

ED 082454

A COMPUTER-BASED PROGRAM FOR DIAGNOSIS AND INSTRUCTION IN MATHEMATICS

DANIEL V. MATTOS, JR.

EM 011 382

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The Pennsylvania State University

The Graduate School

Division of Academic Curriculum and Instruction

A Comparison of Performance versus Presentation Based Methods of Instructing Pre-service Teachers in Media Competencies

A Thesis in

Secondary Education

by

Daniel V. Mattox, Jr.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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March 1972

Date of Approval:

_____

Victor L. Dupuis
Associate Professor of Education
Committee Co-chairman
Thesis Co-adviser

_____

Edward R. Fagan
Professor of Education
Committee Co-chairman
Thesis Co-adviser

_____

Robert L. Lathrop
Chairman, Graduate Faculty in Education

EM 011 382

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An experiment is begun by an investigator who seeks an answer to a problem. It is completed as a sort of summa scholastica which finds the experimenter indebted to the many scholars who aided him in the work. These include:

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Chapter I

INTRODUCTION

During the past century a large number of machines, materials and related methods and techniques have been adopted for use in education. Saettler[1] showed that from 1920 to 1960 this change was termed the "audio-visual movement." It focused on devising and using machines and materials thought to enhance the presentation of lesson content. An increasing number of teacher education institutions and public schools required that teachers gain competency in media usage. Initially competency was gained through trial-and-error, in-service workshops and in methods courses in teacher education programs.

By 1928 several institutions were offering a first course in media for pre-service teachers. Publications on Visual Education, Motion Pictures, the School Journey, Graphics, Photography and the School Museum appeared. In 1937 Hoban[2] produced a textbook for a first course in media. In time such courses and their related textbooks provided the basic format for all introductory training in media. Appropriate methods of instruction were developed and have remained in use in relatively unchanged form to the present day. Such methods are termed conventional instruction in the present report.

---

[1]Paul Saettler, A History of Instructional Technology, New York: McGraw-Hill Book Company, 1968, p. 119.

[2]Charles F. Hoban, Charles F. Hoban, Jr. and Samuel B. Zisman, Visualizing the Curriculum, New York: The Cordon Company, 1937.

Since 1960 extensive research on audiovisual machines, materials, methods and learner use of media has been conducted. One result of the research was a movement toward the creation of a discipline called Educational Technology. It is concerned with learning and instructional behaviors, and with systematic planning and use of media in education. It is based on research and is a far more complex discipline than that of the earlier audiovisual movement. An effort is being made to apply this technology to media training of teachers.

Statement of the Problem

In the present investigation the effectiveness of a conventional and an experimental mode of instruction in a first course in media were compared. The notions upon which each method is based appear to be dichotomous, as may be determined from the following:

Conventional instruction appears to:

1. be based on a physical science concept of instruction.
2. use heterogeneous grouping of classes.
3. emphasize stimulus-control by the instructor in verbal interaction in the classroom.
4. be presentation-oriented.
5. use group instructional procedures and allows the learner to be passive.

The experimental model was based exclusively on research findings which suggested that such instruction should:

1. be based on a behavioral science concept of instruction.
2. use homogeneous grouping of subjects by teaching major.
3. emphasize response-shaping verbal behavior by the instructor.

4. be performance-based.
5. stress individualization and make the learner actively responsible for his own learning.

Each method is further detailed in Chapters II and III and Appendix A.

The independent variable identified was teaching method. The dependent variables were textbook and laboratory achievement, values, and attitudes. For purposes of this study, effectiveness was examined from the standpoint of teaching major only. Related learner variables such as age, sex, past experiences and personality were not investigated. The view that conventional instruction favors the physical science student, held by some authorities, was examined. Differential performances of samples of Natural Science-Mathematics, Humanities and Social Science pre-service teachers along the dependent variables dimensions were examined. Answers were sought for the following questions:

1. Does performance as measured by textbook and laboratory achievement improve when treatment is designed to relate to a teacher's media competency needs? How significant is the difference in results obtained by treatment and conventional methods?
2. Does performance as measured by attitude change improve when treatment is designed to relate to a teacher's media competency needs? How significant is the difference in results obtained by treatment and conventional methods?
3. Is performance, as measured by achievement, related to a pre-service teacher's value schema and choice of teaching major?

4. Is a pre-service teacher's value schema related to his choice of teaching major?
5. Is performance, as measured by attitude change, related to a pre-service teacher's value schema and choice of teaching major?

These questions suggested the following hypotheses:

1. Subjects in an experimental group will score significantly higher in achievement than will subjects of a control group when measured with a two-part achievement test developed for the present investigation.
   a. Subjects of the Natural Science-Mathematics sample of the control group will score significantly higher on achievement than will the Humanities and Social Science subjects.
   b. In the experimental group there will be no significant difference in achievement between the Natural Science-Mathematics, Humanities and Social Science samples.
2. Subjects in an experimental group will score significantly higher than will subjects of a control group when measured with an attitude scale developed for the present investigation.
   a. Subjects of the Natural Science-Mathematics sample of the control group will score significantly higher on attitudes than will the Humanities and Social Science subjects.

b. In the experimental group there will be no significant difference in attitude scores between subjects of the Natural Science-Mathematics, Humanities and Social Science samples.

3. Pre-service teachers classified as Natural Science-Mathematics teachers score significantly higher in theoretical values than do Humanities and Social Science pre-service teachers.

4. Pre-service teachers classified as Humanities teachers score significantly higher in aesthetic values than do Natural Science-Mathematics and Social Science pre-service teachers.

5. Pre-service teachers classified as Social Science teachers score significantly higher in political values than do Natural Science-Mathematics and Humanities pre-service teachers.

6. There is a significant positive correlation that exists between post-test attitudes and achievements for both the control and experimental groups.

   a. The experimental group Natural Science-Mathematics sample correlation of attitudes and achievements will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

   b. The experimental group Humanities sample correlation of attitudes and achievements will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

c. The experimental group Social Science sample correlation of attitudes and achievements will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

7. There is a significant positive correlation that exists between value schema and posttest achievements for both the control and experimental groups.

   a. The experimental group Natural Science-Mathematics sample correlation of theoretical values and achievements will be significantly higher than the like correlations for the related control group sample and both correlations will be statistically significant.

   b. The experimental group Humanities sample correlation of aesthetic values and achievements will be significantly higher than the like correlations for the related control group sample and both correlations will be statistically significant.

   c. The experimental group Social Science sample correlation of political values and achievements will be significantly higher than the like correlations for the related control group sample and both correlations will be statistically significant.

8. There is a significant positive correlation that exists between value schema and posttest attitudes for both the control and experimental groups.

a. The experimental group Natural Science-Mathematics sample correlation of theoretical values and attitudes will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

b. The experimental group Humanities sample correlation of aesthetic values and attitudes will be significantly higher than the like correlation of the related control group sample and both correlations will be statistically significant.

c. The experimental group Social Science sample correlations of political values and attitudes will be significantly higher than the like correlation of the related control group sample and both correlations will be statistically significant.

9. There is a significant positive correlation that exists between textbook and laboratory achievement for the control group but not for the experimental group and correlations are significantly different between groups.

a. The control group Natural Science-Mathematics sample correlation of textbook and laboratory achievement will be significantly higher than the like correlation of the related experimental group sample and only the control group sample correlation will be statistically significant.

b. The control group Humanities sample correlation of textbook and laboratory achievement will be significantly

higher than the like correlation of the related experimental group sample and only the control group sample correlation will be statistically significant.

c. The control group Social Science sample correlation of textbook and laboratory achievement will be significantly higher than the like correlation of the related experimental group sample and only the control group sample correlation will be statistically significant.

d. The sample correlations within each group do not differ from each other.

e. Correlations do not differ from sample to sample between groups.

Need for the Study

An extensive review of the literature revealed no evidence that the impact of a first course in media had ever been systematically examined. Surveys of course content, tests of machines operations modes, and descriptions of common practices have been reported. Such articles had little pertinence to the present investigation. There was no evidence that the purpose and scope of the introductory course had changed appreciably since its inception. As new media, new techniques and materials, and research findings were reported, they were added to the introductory course content. However, no systematic revision of the course based on empirical evidence has apparently been done. The chief guide to content appeared to be textbooks developed for the course. Instructor methods appeared to be based on the textbook and to consist of practices held in common with other instructors in such courses.

An organization vitally concerned with teacher education is The American Association of Colleges for Teacher Education /AACTE/. In 1967 the AACTE[3] published proposed New Standards and Evaluative Criteria for the Accreditation of Teacher Education. In his analysis of these standards, Woodruff[4] suggested that 8 of the 28 standards are specifically concerned with "effectiveness of instruction" and with the "competence" of the graduating teacher. Standards related to the present study are those dealing with "involvement of students in program improvement," and "emphasis on individualization of programs." Of fifteen new ideas about instruction and competence in teaching listed by Woodruff, the following are related to the present study:

> . . . 3. The emphasis on media of all kinds . . . 4. The analysis of the verbal interaction process . . . 5. Attempts at self-directed learning by students . . . 6. The new uses of operant conditioning processes in shaping classroom behavior of students . . . 10. The shift from informational to behavioral objectives . . . 14. Diagnosis and prescription practices for starting a student at his appropriate point.[5]

He suggested that innovative instruction might take the following form:

> The learner shifts from a passive, inactive role to an active aggressive, self-guiding investigator role . . . the learner has to move from academia and its verbalistic trappings to a marketplace kind of setting-- . . . The teacher shifts from the traditional verbalistic dispensing role to a backstage role consisting of planning, stage setting, diagnosing, prescribing and trouble shooting.[6]

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[3]The American Association of Colleges for the Accreditation of Teacher Education, Standards and Evaluative Criteria for the Accreditation of Teacher Education, Washington, D.C.: The Association, 1967.

[4]Asahel D. Woodruff, "Accreditation by Evaluation of the Product," In: The AACTE, Teacher Education Issues and Innovations, Washington, D.C.: The Association, 1968, pp. 237-245.

[5]Ibid., pp. 238-240.

[6]Ibid., p. 245.

In a separate analysis of the same AACTE standards, Mars wrote:

> The first area of concern deals with the undergraduate program and development of competencies on the part of classroom teachers. . . . It is evident that strong representations /sic/ need to be made (to) NCATE /National Council for the Accreditation of Teacher Education/ . . . /to the effect that/ adequate courses and/or training opportunities need to be made /for/ professional practitioners in the selection, utilization and production of media.[7]

As shown in the statements cited above and elsewhere in this study, the thrust in contemporary teacher education is toward performance-based programs. Considerable research in this direction has been reported, but none of the research reports dealt with a first course in media. The present investigation seeks to examine a performance-based first course in media.

The lack of evidence on media courses may suggest that training of pre-service teachers in media competency is a low level need which can be accomplished elsewhere in teacher education programs. This is not necessarily the case Although the present requirements for such training are vague, they do exist.

Woellner and Wood[8] showed that no regional accrediting association and only one state department of education required specific training in audio visual methods and materials for pre-service teachers. All teacher certification codes of the fifty states

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[7]Walter J. Mars, "Where Does Technology Fit in the Accreditation of Teacher Education?", Audiovisual Instruction, Vol. 12, No. 10, December 1967, p. 1035.

[8]E. H. Woellner and M. A. Wood, Requirements for Certification, 34th Edition, Chicago, Ill.: University of Chicago Press, 1969.

require that teachers have from three to twelve semester hours of courses in general methods. Within such methods courses training in audio visual methods and materials is required.

Since most teacher education graduates come from NCATE institutions and NCATE standards require increased competencies in media, it seems appropriate to conclude that a significant number of newly certified teachers are acquiring increased competency in media. Stinnett showed that:

> By 1970, NCATE had accredited . . . 470 of the 1,246 U.S. institutions preparing teachers . . . it is estimated that NCATE-accredited institutions prepare about 80% of the newly graduated teachers each year.[9]

An institution must meet specified standards in order to be accredited by NCATE--National Council for the Accreditation of Teacher Education.[10] Such institutions must have both adequate media resources and total faculty involvement in the use of these resources. Within the teacher education program, an instructional resources center must be provided. The teacher education program must also have specific provisions for training teachers in media competencies.

Although pre-service teachers are required to be trained in media competencies, the status of such training has been questioned. McMahan wrote:

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[9]T. M. Stinnett, A Manual on Certification Requirements for School Personnel in the United States, Washington, D.C.: National Commission on Teacher Education and Professional Standards, 1970, pp. 4-8.

[10]National Council for the Accreditation of Teacher Education, Standards and Guide for Accreditation of Teacher Education, Washington, D.C.: The Council, 1960, 24 pp.

> Surveys of the amount of emphasis given to the development of media competencies by colleges and universities show a shocking amount of lack of attention in this crucial area. One, for instance, made by the National Council for Accreditation of Teacher Education revealed that only 26 percent of its affiliates (117 institutions) required audiovisual instruction . . . Unfortunately, even when media experiences are currently provided, they function all too frequently as an appendage to the "real" educational program or they consist only of development of necessary, but low-level, competencies in machine operation.[11]

In 1970 The Commission on Instructional Technology, headed by Sterling M. McMurrin, reported to the President and the Congress of the United States that:

> The organization of schools and colleges takes little account of even what is now known about the process of human learning, including the range of individual differences among learners and styles of learning.[12]

and,

> Overall, it is reasonable to say that despite increasing demands for greater individualization of instruction and for more emphasis on learning rather than teaching, audiovisual technology is seldom used to bring about educational change.[13]

and finally,

> Despite recent progress in educational research and development, educators still have few reliable validated guidelines for choosing one instructional medium over another.[14]

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[11]Marie McMahan, "Teacher Media Competencies," Audiovisual Instruction, Vol. 12, No. 10, December 1967, pp. 1060-1061.

[12]To Improve Learning, Report by the Commission on Instructional Technology, Washington, D.C.: The Commission, United States Government Printing Office, 1970, p. 14.

[13]Ibid., p. 67.

[14]Ibid., p. 79.

The Commission defined technology both as media, and as:

> . . . a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based upon research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction.[15]

In an analysis of the Commission report, Ely chose to emphasize:

> . . . the future of the field lies within the behavioral science orientation to instructional technology even though the report largely follows a media qua media approach.[16]

Briggs analysis of the report contained two points which are relevant to the present study. These are:

> . . . 4. Technology can humanize instruction by providing the tools for individualization . . . 9. Presentation devices alone are not adequate for learning; there must be learner responding with feedback.[17]

Although the Commission report is concerned with all education and all media usage, its recommendations are relevant to the present study. These suggestions and the earlier comments on the inadequacy of media competency training show that a need exists for research in the area. New, performance-based methods in teacher education are needed. The present investigation sought to meet such needs.

No similar reports or authoritative statements regarding conventional instruction in a first course in media were found. Numerous reports, comparing new media with older methods and materials, were discovered. The typical conclusion to such reports advocated the use of one or the other approach. Saettler pointed out that:

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[15]Ibid., p. 4.

[16]Donald P. Ely, "Something for Everyone," Audio Visual Communication Review, Vol. 18, No. 3, Fall 1970, p. 310.

[17]Leslie J. Briggs, "A Two-Headed Image," Audio Visual Communication Review, Vol. 18, No. 3, Fall 1970, pp. 313-314.

> . . . these "advocacy" reports are useful in determining whether to use or to reject particular methods, machines or materials, but they do not solve the broader aspects of the problem of improving teaching effectiveness by the use of instructional technology.[18]

None of the advocacy reports appeared to be relevant to this study.

Definitions

Unless otherwise indicated, all definitions have been adapted from Good[19].

Achievement, learner is the status of a learner with respect to attained skills or knowledge as compared with other learners or with the school's adopted standard. Achievement of knowledge and skills are attained in textbook and laboratory types of lessons in this study.

Achievement, gain in an experiment is the measured increment for an individual or a group in some factor as the result of a certain treatment.

Attitude in the present investigation is the teacher's attitude toward his intended use of specified media and media competencies.

> This definition is adapted from Good's attitude, specific, which is an attitude toward a narrowly defined relatively concrete attitude object . . .

Attitude change belongs to the affective domain of educational objectives.

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[18]Saettler, History, p. 125.

[19]Carter V. Good, Dictionary of Education, New York: McGraw-Hill Book Company, 1959.

Audiovisual aids are any of those devices by means of which the learning process may be encouraged or carried on through the sense of hearing and/or sense of sight, syn. audiovisual materials.

Media research also uses the terms media, learning resources, and instructional resources synonymously with the term audiovisual aids. This will be frequently observed in the citations of research made in the present study.

Audiovisual instruction is (1) that branch of pedagogy which treats of the production, selection and utilization of materials of instruction that do not depend solely on the printed word, (2) instructional techniques employing materials and procedures not dependent solely upon the printed word.

BROI Model is the experimental treatment model developed from research findings for the present investigation. BROI is an acronym for Behavioristic, Response-oriented and Individualized mode of instructing in media competency.

Conventional method is the presentation, stimulus and group oriented approach to teaching a first course in media. Control group subjects receive this type of instruction in this study.

First course in Media /audiovisual methods and materials, audiovisual aids, learning resources, instructional technology/ is an introductory course required of teachers in gaining media competency. Pre-service teachers gain competency in the selection, use, production and evaluation of particular machines, materials, methods and techniques used in classroom instruction.

Guided discovery is the method of instruction used in the experimental model to replace lecture-presentations. Instructor behavior consists of verbal statements and the use of illustrative materials which are designed to evoke statements from and to motivate the learner. Cues in the form of fragmentary statements or questions, and hints such as words or numbers are used to guide verbal response. The learner contributes ideas and questions which are based upon his reading, past experiences and media competency needs. This technique is also applied in laboratory situations in the form of guided demonstrations performed by the student. This replaces the explanation-demonstration of conventional laboratory methods.

Instructional Technology is a systematic way of planning, conducting and evaluating the total process of learning and teaching in terms of specific objectives. The following definitions also apply:

> The Behavioral Science concept of instructional technology is that which says that educational practice should be more dependent upon the methods of science . . . and with setting instructional goals in terms of measurable student behaviors such as achievement, attitudes, interests and motivations.[20]

> The Physical Science concept of instructional technology views the various media as aids to instruction and tends to be preoccupied with the effects of devices and procedures, rather than with the differences of individual learners or with the selection of instructional content.[21]

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[20]Saettler, History, pp. 4-6.

[21]Op. Cit., p. 2.

Laboratory learning is that which occurs as a result of criterial performance of activities and experiments in laboratory work. Media is used synonymously with such terms as audiovisual aids, audiovisual methods and materials, and learning resources. Objectives are the goals and bases upon which lessons are prepared. Bloom stated:

> Educational objectives are statements of desired changes in the thoughts, actions or feelings of students that a particular course, or educational program should bring about . . .[22]

In the present study textbook, laboratory and attitudinal objectives are used. These objectives are roughly comparable to the cognitive, psychomotor, and affective educational objectives defined in Krathwohl.[23]

Performance-based instruction is that used in treatment in the present investigation. Learners achieve criterion in media competencies by engaging in selected direct activities. Textbook learning occurs through reading, discussion, classroom activities and guided-discovery teaching. Laboratory learning occurs due to active learner experiences in laboratory work. Attitude change occurs due to all work in the classroom and laboratory, particularly through learner selection, manipulation, production and evaluation of media and related materials. Learners select activities, prepare objectives and plan work.

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[22]Benjamin S. Bloom, "Testing Cognitive Ability and Achievement," In: Ned L. Gage, Handbook, p. 389.

[23]David R. Krathwohl, Benjamin S. Bloom and Byron B. Masia, Handbook II. Affective Domain, Taxonomy of Educational Objectives, New York: David McKay Co., Inc., 1964, pp. 6-7.

Emphasis is on having the learner be actively responsible for identifying and meeting his own needs in media competencies.

Presentation-oriented instruction, as used in conventional instruction, is essentially a media-illustrated lecture. In laboratory sessions the instructor uses explanation-demonstration technique to present correct procedures which learners must replicate. Objectives, materials and activities are selected, used and controlled by the instructor. Attitude change is due to instructor advocacy of media and by appeal to authority.

Stimulus-control is an instructor procedure in which verbal and media presentation material is selected for its ability to give accurate content related to instructional objectives. Stimulus materials are pre-selected by the instructor and presented as the ultimate in content.

Response-shaping is an instructor technique which focuses on activating responses in learners. Stimuli are controlled by selecting them for their ability to elicit particular responses in learners.

Textbook learning is that which occurs due to learner reading of textbooks and related printed material, and it is due to learner participation in classes concerned with transmitting textbook content to learners.

Theory of instruction, according to Bruner,

> . . . is prescriptive . . . is a normative theory. It sets up criteria and states the conditions for meeting them. It . . . should specify the experiences . . . the ways in which a body

of knowledge should be structured . . . the most effective sequences in which to present the materials to be learned . . .[24]

Theory of learning, as used in the present investigation is adapted from Hill,[25] and is concerned with behavior modification. It emphasizes conditioning by contiguity after Watson and Guthrie, and reinforcement after Thorndike and Skinner. It is concerned with the analysis of behavior and the use of conditioning principles to modify behavior.

Value System is an inclusive set of deep-lying attitudes and beliefs that tend to direct the persons habitual responses in various situations.

Values, theoretical are the teachers' attitudes and beliefs to the effect that theories, axioms, and postulates are the best means for describing the universe.

Values, aesthetic are attitudes and beliefs toward principles derived from artistic, literary and cultural endeavors of man: such principles provide man with directions to the Good Life.

Values, political are aspects of human interactions recorded in the mores, ways and laws of man. They are regarded as being worthwhile, important and significant for the proper governance of personal and group life.

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[24]Jerome S. Bruner, "Some Theorems on Instruction Illustrated with Reference to Mathematics," Chapter XIII, In: Ernest R. Hilgard, National Society for the Study of Education, Theories of Learning and Instruction, Chicago, Ill.: The Society, The University of Chicago Press, 1964, pp. 306-8.

[25]Winfred F. Hill, "Contemporary Developments within Stimulus-Response Learning Theory," Chapter II, In: Hilgard, Theories, pp. 28-30.

Limitations of the Study

The use of the findings of the present investigation are limited to answering the questions and theoretical hypotheses posed as the bases for this study. Generalization of findings with respect to the BROI Model outlined earlier should be deferred until the investigation and its findings are replicated.

Chapter II

REVIEW OF THE LITERATURE AND RELATED RESEARCH

Purpose for the Review

A review of the literature on teacher education and related media research was conducted in order to determine what had been done in the problem area. This review has been categorized into the following search criteria:

1. Research which may be classified with the general class of problems to which the present investigation belongs.
2. Reports with respect to media competencies of teachers.
3. Authoritative views on research design and procedures.
4. Research findings and expert opinion which support
   a. the BROI Model.
   b. conventional instruction in a first course in media.

Sources Consulted and Time Limits of the Survey

The following major sources included in the holdings of Pattee Library were studied: Dissertation Abstracts,[1] ERIC Reports,[2] Education Index,[3] Encyclopedia of Educational Research,[4] and Phi Delta Kappa Research Studies in Education.[5]

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[1]Dissertation Abstracts, University Microfilms, Ann Arbor, Mich.: A Xerox Co., all issues to 1971.

[2]Project ERIC, Washington, D.C.: Superintendent of Documents, United States Government Printing Office, all issues to date.

[3]Education Index, New York: The H. W. Wilson Co., 1950 to 1971.

[4]American Educational Research Association, Encyclopedia of Educational Research, Toronto, Canada, The Association, 1969.

[5]Stanley Brown and Mary Louise Lyda, Research Studies in Education, Bloomington, Ind.: Phi Delta Kappa, 1951 to 1970.

Most media research has taken place since 1950. The literature since that date was searched intensively. A search of all dissertation titles in education prior to 1950 revealed little of relevance to the present study. The best sources of findings from older researches were in Gage[6] and Saettler.[7]

Most Helpful Studies or Reports

No single report was discovered or evaluated as being uniquely helpful to the present investigation. Little or no research has apparently been done in the problem area. It was necessary to consult many sources and often to combine related findings in order to make a particular point. All the works cited in the present report were of course helpful, but especially so were those of the several authorities who were repeatedly quoted in the present report.

Research which may be Classified with the General Class of Problems to which the Present Investigation Belongs

In a study of a half century of instructional technology, Saettler found that:

> . . . media research has had little relevance to instructional design. Almost all of media research has focused on media variables. Such research shows the need for a more systematic theory of instruction. As yet there is no theory of audiovisual instruction or instructional technology.[8]

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[6]Ned L. Gage, Handbook of Research on Teaching, Chicago, Ill.: For the American Educational Research Association, Rand McNally and Co., 1963.

[7]Saettler, History.

[8]Paul Saettler, "Design and Selection Factors," Review of Educational Research, Vol. 38, No. 2, April 1968, pp. 115-128.

Knowlton made an even more pointed criticism, as follows:

> . . . in most of these studies it was the medium variable which purportedly was investigated when in fact no satisfactory method of analysis which separated the medium from the sign vehicle of the message carried by the channel was used.[9]

Scheuller and Lesser commented:

> . . . media research avoids much of the inherent complexity of the instructional process, fails to apply theory systematically, focuses upon techniques and applied administrative problems, produces a profusion of non-significant differences, and studies the gross effects of teaching procedures, ignoring the process by which these effects are derived.[10]

Saettler[11] showed that media methods and related research derive either from the physical science concept of instructional technology; or, they derive from the behavioral sciences concept of instructional technology. No research has been reported on comparisons of the two. They are given attention in this study.

The reports cited below contained data and ideas which are relevant to the present study. Farwell showed that value scheme play a part in career choice, as follows:

> The Cornell Values survey of eleven institutions revealed a distinctive pattern of values, attitudes and beliefs amounting to a special "climate" at certain institutions.

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[9]James Q. Knowlton, A Socio and Psycho Linguistic Theory of Pictorial Communication, Bloomington, Ind.: Indiana University, 1964, 294 pp.

[10]Herbert Scheuler and F. S. Lesser, Teacher Education and the New Media, Washington, D.C.: American Association of Colleges for Teacher Education, 1967, p. 37.

[11]Saettler, History, p. 6.

> There were identifiable differences in both attitudes and values among students who had selected certain occupational fields.[12]

Follow-up data showed that 70 percent of the students in the survey were psychologically consistent in their job choices. Their manifested values fell in line with their future work. An earlier study by Jacobs[13] reported similar findings.

Hoban and Rege[14] studied the value structures of professional media personnel, classified as researchers and non-researchers. Using a 26 item mailed questionnaire of the Laswellian model of values, the authors surveyed 758 domestic subscribers to Audio Visual Communication Review. 484 respondents provided 446 value reports. Ninety percent of the respondents had the Masters Degree and fifty percent also had the Doctorate. Results showed that researchers tend to lean to theoretical values, while non-researchers lean to humanistic and social values. Non-researchers were principally teachers and media administrators.

Lysaught and Pierloni[15] used the Allport-Vernon-Lindzey Study of Values as one of several variables to predict success in programing.

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[12]E. D. Farwell, P. A. Heist and T. R. McConnell, "Colleges and Universities--Student Population-Attitudes," In: Encyclopedia of Educational Research, New York: The Macmillan Co., 1960.

[13]Phillip E. Jacobs, Changing Values in College, New York: Hazen, 1956.

[14]Charles F. Hoban and A. Rege, "Value Structures of Researchers and Non-researchers," Audio Visual Communication Review, Vol. 17, No. 4, Winter 1969, pp. 410-427.

[15]Jerome P. Lysaught and R. G. Pierloni, "Predicting Individual Success in Programming Self-Instructional Materials," Audio Visual Communication Review, Vol. 18, No. 1, Spring 1970, pp. 5-24.

Subjects who scored above 47 on the theoretical values plus below 40 on religious values were selected for training. Subjects whose scores were the reverse of the above were not selected.[16] The findings of the study confirmed the usefulness of these cut-off values scores as one predictor variable.

Majer studied the achievement of students in an introductory course in physics. One group was taught in traditional lecture fashion, while the experimental group was in a Computer Assisted Instruction Media mode. The Omnibus Personality Inventory was one of a battery of tests used to measure personality variables. Included in the 8 scales of this test are theoretical, aesthetic and religious scores. The findings suggested that:

> Further investigation of interaction between individual characteristics and Instructional Mode might eventually lead to the improvement of the instructional process by directing students into differential course formats depending upon their attributes and learning style.[17]

In the present investigation the performance variable termed attitude is theorized to change more readily with treatment than with conventional instruction. Loree showed that in shaping teacher's attitudes the following should be considered:

> First, it must be assumed that the attitude identified in the objective is one that facilitates the acquisition of teaching competencies and/or is characteristic of the "good teacher." . . . studies have demonstrated that it is possible to modify the belief system of teachers through course work . . . conditioning concepts may be useful in explaining and predicting

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[16]Gordon W. Allport, Philip E. Vernon and Gardner Lindzey, Study of Values, Revised, New York: Houghton Mifflin Co., 1951, Revised 1962.

[17]Kenneth Majer, "Differential Relationships Between Personality and Performance under Dissimilar Modes of Instruction," Audio Visual Communication Review, Vol. 18, No. 2, 1970, p. 179.

> the attitudinal changes. . . . An attitude elicits a feeling of pleasantness or unpleasantness. This feeling tone aspect of an attitude may be explained in terms of classical conditioning. The behavioral component of an attitude may be learned through instrumental conditioning.[18]

Reports with Respect to the Media Competencies of Teachers

Meierhenry[19] reported that "there are three types of competencies which all teachers should have and which should be incorporated into the teacher education program." These classes are theory, message design and skills. Theories include those concerned with learning, structure of knowledge, discovery, inquiry, inductive reasoning and many newer speculations which teachers need to be able to examine. Message design is the development of an instructional sequence or an instructional system. Teachers need to develop skill in the production of materials.

Meierhenry also stated:

> . . . some teacher educators who have not carefully followed the proposals presented will assume, for example, that no/sic/ . . . special needs to be given to the area of media or media competencies in teacher education. . . . all persons responsible for the education of teachers . . . must provide for learning experiences involving media in order that prospective teachers will experience firsthand contributions of such learning resources.[20]

Streeter[21] selected 47 of the media competencies identified by Meierhenry. These media competencies were a portion of the total

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[18]M. Ray Loree, "Shaping Teacher's Attitudes," In: B. Othaniel Smith, Research in Teacher Education, Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1970, p. 100.

[19]Wesley A. Mierhenry, "Teacher Competencies Project," Audio-visual Instruction, Vol. 12, No. 10, December 1967, p. 1030.

[20]Ibid., p. 1031.

[21]C. Edward Streeter, "Teacher Competency and Classroom Use of Educational Media," Audiovisual Instruction, Vol. 14, No. 1, January 1969, p. 1024.

list of teacher competencies. Faculty members at three Michigan Universities recommended schools which used reasonable amounts of media equipment and materials. Teachers from the schools selected were then asked to respond to a questionnaire. Biographical data, teacher actual competency with media and teacher use of media were reported.

Of 500 teachers in the selected schools 486 responded to the survey. Seventy five percent indicated that they could operate each piece of equipment listed. There was a positive correlation, r = .41, between teacher competency scores and total frequency of use. Correlations ranged from -.02 to .33 : 33 correlations were significant at the .005 level and 8 at the .05 level. The six non-significant competency and use correlations were minor. These competencies included routine machine operations which were infrequently used by the respondents.

Twyford[23] abstracted data from a survey made by the Eastern Regional Institute for Education. Teachers and administrators in thirty schools in New York and Pennsylvania were surveyed for views on curriculum materials information. Respondents believed that they received adequate information on price, purchasing and related information. They indicated a need for more information on content, how materials can be used best and how other teachers fared in using such materials. The results suggest that teachers need competencies and information other than routine machines information.

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[23]Loran Twyford, Abstract of "Curriculum Materials Information Survey," Audio Visual Communication Review, Vol. 16, No. 1, Spring 1968, p. 113.

Several other questions have been raised by McMahan[24] and others. Gropper[25] showed that audiovisual specialists use the presentation approach and thus are stimulus-control oriented. Such an approach tends to emphasize textbook learning. The concept of media competency implies more than textbook learning. It implies active response and suggests performance-based modes of training. The continued use of presentation-oriented methods in a first course in media is a practice which is open to question.

Authoritative Views on Research Design and Procedures

The authorities cited earlier believe research design to be a neglected topic in educational media research. Most such research has focused on media and message variables, when it should deal with the question of how teachers can be trained more effectively. Gagné suggested the following for media design:

> . . . experimental studies of media should be reviewed . . . learning theory should be analyzed . . . the events of instruction should be analyzed . . . and, more attention should be given to the learner's contribution to his own learning.[26]

Carpenter's list of the most crucial problems in educational technology was relevant to the design problem here. He listed:

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[24]McMahan, Competencies.

[25]George L. Gropper, "Programming Visual Presentations for Procedural Learning," Audio Visual Communication Review, Vol. 16, No. 1, Spring 1968, pp. 33-56.

[26]Robert Gagné, In: Phil C. Lange, "Report from Houston, Audiovisual Instruction, Vol. 13, No. 6, June 1968, pp. 554-557.

> 1. . . . ordering events which affect learning. 2. . . . the practical management of learning behavior, . . . 3. the selection of means to accomplish standards of training or education, and the placement of responsibility for various functions in the instructional situation. 4. . . . of behavioral orientation and that of directionality of learning efforts. 5. . . . the cooperation, costs, content and quality.[27]

Research Findings and Expert Opinion Which Support the BROI Model

Gropper provided both a distinction between conventional and behavioristic methods, and suggestions for what treatment should be. He stated that:

> . . . most audiovisual specialists are concerned with the presentation of information and may, therefore be dubbed stimulus-oriented.[28]

In another article he stated:

> . . . instructional strategies rest on the fundamental distinction which separates stimulus-oriented and response-oriented approaches. The stimulus-oriented approach places stress on the design of materials. Response-oriented approaches focus on the concept that the learner learns the response that he practices.[29]

and,

> It is the clarity and organization of these stimulus materials that make for effective learning. In the response orientation it is the character of response practice which is crucial . . . Instruction must provide for response practice.[30]

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[27]C. Ray Carpenter, "A Constructive Critique of Educational Technology," Audio Visual Communication Review, Vol. 16, No. 1, Spring 1968, p. 17.

[28]George L. Gropper, "Learning from Visuals, some Behavioral Considerations," Audio Visual Communication Review, Vol. 14, No. 1, Spring 1966, pp. 37-69.

[29]George L. Gropper, "The Design of Stimulus Materials in Response-Oriented Programs," Audio Visual Communication Review, Vol. 18, No. 2, Summer 1970, p. 130.

[30]Ibid., p. 130.

Gropper's theories and research make a distinction between presentation the performance-based modes of instruction.

The basic principles for the third aspect of the experimental method, individualization, were drawn from Bolvin who stated:

> (1) for individualization to be economically and operationally feasible, much of the instructional materials must be self-instructional, (2) the student should be actively involved in the learning process, (3) not all students require the same amount or kind of practice to achieve mastery of a given objective, and (4) different styles of learning require different techniques of instruction.[31]

Concern over response-shaping, reinforcement and behavioristic principles in the treatment model required some theory as a starting point. Such a theory was drawn from the work of Skinner. Most media research also uses his work as a departure point.

Skinnerian Theory[32] is concerned with the contingencies of reinforcement which: (1) permit the shaping of behavior, (2) show the relationship between behavior and its consequences, and (3) permit more effective control of behavior. It uses the Law of Effect to make sure that effects do occur and that they occur under optimal conditions. It insures that the materials and methods for reinforcement are available. It provides students with immediate feedback and

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[31]John O. Bolvin, "Implications of the Individualization of Instruction for Curriculum and Instructional Design," Audiovisual Instruction, Vol. 13, No. 3, March 1968, pp. 238-242.

[32]B. F. Skinner, "The Science of Learning and the Art of Teaching," In: A. A. Lumsdaine and R. Glaser (Eds.), Teaching Machines and Programmed Learning, Washington, D.C.: Department of Audio Visual Instruction, National Education Association, 1960, pp. 99-113.

makes the student an active not a passive learner. It provides a systematic foundation for conducting media research.

Lumsdaine provided the following comments which support treatment:

> Concern with active, explicit, student response as an object of experiment stems in part from the emphasis on "learning by doing" espoused by Dewey and elaborated in behavioral terms by Guthrie (1935) and others . . . active, overt student response is of great interest for two reasons (1) Procedures which foster active student response are generally, though not uniformly, favored by experimental evidence over procedures which do not. (2) more important, overt responses by definition can readily be observed, can be checked and, potentially, can be effectively controlled.[33]

Of response control, Lumsdaine wrote:

> It should be clear that control of student response can reside in considerable part in the instructional materials, and particularly in the way in which they call for or prompt response elements of the to-be-learned behavior . . .[34]

In addition to active, overt response, there are certain student activities that are necessary for learning to occur. Rothkopf[35] calls these mathemagenic activities. These include set, attention, orienting reflex, information processing, translation, discrimination, segmentation, cognition and rehearsal. In analyzing the boundary conditions for such behaviors, Frase wrote:

> It appears likely that the physical proximity of text and a related post-question can be especially important for retention. A pre-question interacts with the text to permit the selection of relevant information and the rejection of incidental

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[33]A. A. Lumsdaine, "Instruments and Media of Instruction," In: Gage, Handbook, p. 609.

[34]Lumsdaine, Instruments, p. 587.

[35]E. Z. Rothkopf, "The Concept of Mathemagenic Activities," Review of Educational Research, Vol. 40, No. 3, June 1970, pp. 325-336.

> information. Post-questions . . . are especially useful when motivation is low . . . Structural information can act as a general orienting direction (or advance organizer; Ausabel, 1963) that controls learning behaviors pertaining to categories of information . . . Questions are motivational stimuli. They have arousal and Associative outcomes.[36]

Anderson[37] showed that there are two processes in attention. These are: orienting receptors toward stimuli, and learner encoding of stimuli. These may be enhanced by prompting, requiring overt responses, providing natural language mediators between cues and responses and arranging tasks so as to require full processing of learning tasks.

Research Findings and Expert Opinion which Support Conventional Methods

A review of the literature provided no findings or comments which support conventional instruction. Other reports appeared to be pertinent. Conventional instruction uses the cue-summation principle, and uses multi-media and multi-channel means to accomplish this end. Anderson[38] found that media relate to one another differently along different dimensions of judgement. Messages do not necessarily evoke the same given response from medium to medium. Feigenbaum and Simon[39] developed a model of rote learning which states that one

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[36]Lawrence T. Frase, "Boundary Conditions for Mathemagenic Behaviors," Review of Educational Research, Vol. 40, No. 3, June 1970, pp. 344-346.

[37]Richard C. Anderson, "Control of Student Mediating Processes During Verbal Learning and Instruction," Review of Educational Research, Vol. 40, No. 3, June 1970, pp. 349-369.

[38]James A. Anderson, "More on the Equivalence of Statements Presented in Various Media," Audio Visual Communication Review, Vol. 16, No. 1, Spring 1968, p. 25.

[39]E. A. Feigenbaum and H. A. Simon, "Brief Notes on the EPAM Theory of Verbal Learning," In: Verbal Learning, New York: McGraw Hill, 1963.

item of information must be processed before another item can enter processing. Broadbent[40] concluded that the perceptual system generally functions as a single channel system. Severin noted that "too often, materials have been presented by two channels and the testing for gain has been in one channel."[41]

Each of these authorities provided comments and findings which tend to reject the principles and practices inherent in conventional instruction. Its emphasis on providing many stimuli over several channels by means of multiple media appears to disregard evidence to the contrary provided by media research.

Summary

An extensive review of the literature provided no reports of research similar to this study. However, a number of reports had some relevance for the design of the experiment.

Between 1930 and 1960, several reports of surveys of teacher education practices in a first course in media showed what the typical content of such a course has been. Since 1950, the machines operations aspect of such content has been examined and a number of innovative self-instructional, performance-based machines laboratory approaches

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[40]D. E. Broadbent, Perception and Communication, New York: Pergammon, 1958.

[41]Werner Severin, "Another Look at Cue Summation," Audio Visual Communication Review, Vol. 15, No. 3, Fall 1967, p. 241.

have emerged. Since 1960, specific media competencies of classroom teachers have been identified. The need for training in these competencies has been suggested in studies conducted with in-service teachers. These studies showed statistically significant correlations between teacher media competency and actual use of specified competencies. No reports on how such competencies are now taught in a first course in media, however, have been made. Values and attitude variables reported in a wide variety of media research reports have suggested that these variables should be used in this study.

No evidence from the research literature to support conventional instruction in a first course in media was found. No evidence that such instruction, either was based on or used media research findings, could be found. A growing number of researchers question the validity of the content and methodology of such instruction. They stress the need for investigations of performance-based, individuated, response-shaping and active learner modes of instruction, as opposed to conventional modes.

The treatment model developed by the experimenter is a response to such appeals. It is based exclusively on research findings and the recommendations of media authorities, whose works are liberally cited in this Chapter.

Chapter III

PROCEDURES

What Explanations Were Investigated in This Study?

In this study the effectiveness of conventional versus an experimental model of instruction in a first course in media was compared. An answer was also sought for the question of whether instruction favored one class of teaching majors over another.

Performance was the dependent variable. It consisted of: two types of achievement, textbook and laboratory; attitude toward media; and, subject's value schema as related to his teaching major.

The method of instruction was the independent variable. It was not measured, except that systematic observation of classroom verbal behavior was conducted. This procedure was used to determine if each method was appropriately implemented, and whether methods differed.

Experimental Design

A Pretest-Posttest Control Group Design of Form 4 described by Campbell and Stanley[1] was used. It is:

R	O_1	X	O_2
R	O_3		O_4

The authors showed that this design controls for all known internal sources of invalidity. These sources are history, maturation, testing,

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[1]Donald T. Campbell and Julian C. Stanley, "Experimental and Quasi-experimental Designs for Research on Teaching," In: Gage, Handbook, pp. 183-194.

instrumentation, regression, selection, mortality, and related interactions.

The design used in this study was weakest in the area of external validity, particularly in the interaction of testing and treatment. This problem was controlled by administering the tests within the context of the course. The pretest was offered as a diagnostic battery and the posttest as a final examination. Equated forms of the achievement test were used in pre- and posttests.

External invalidity due to selection and treatment was controlled by means of random sampling and the use of pretesting. Subjects' reactions to treatment were controlled by having testing and treatments as plausible variants in the course. Separate instructors were used to avoid treatment interference which might occur if only one instructor were used for both the control and experimental sections.

Instrumentation

The dependent variables were measured as follows:

1. Achievement--two forms of a two-part achievement test were developed and used. Each test consisted of 100 four-alternative multiple choice test items. Part 1 consisted of fifty items which measured textbook learning. Part 2 consisted of fifty items which measured laboratory learning. Copies of the tests and development data are contained in Appendix B.
2. Attitudes--a fifty item forced-choice attitude scale was developed and used. This instrument measured subjects attitude toward their intended use of media. A copy of the scale and development data are contained in Appendix B.

3. Values--The Allport-Vernon-Lindzey Study of Values[2] was used to determine whether a subject subscribed to one or another of theoretical, aesthetic or political values.

4. Flanders Interaction Analysis as a Feedback System[3] was used to measure classroom verbal behavior. The data which it provided was used to establish the fact that methods differed, and that each was appropriately implemented.

Description of the First Course in Media

The following course description was obtained from the official bulletin of the university at which the present study was conducted.

> Learning Resources 301 - Audio-Visual Education 2 credits
> (Professional course required of all students in Education)
> Pre-requisite: General Psychology. A consideration of the needs for sensory techniques and the integration of all learning resources is given, with attention to the psychological processes involved. Through class and laboratory work the student will have an opportunity to become acquainted with materials and equipment and skilled in audiovisual techniques within the teaching field. Activities will include actual production of materials for class use and participation in their use.[4]

Some 1400 students take this course annually. They attend two lecture-presentations and one laboratory session per week. Sessions are fifty minutes long. The course content, format and conduct are described below under conventional instruction. The

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[2]Allport, Study.

[3]Ned A. Flanders, Interaction Analysis in the Classroom, A Manual for Observers, Ann Arbor, Mich.: University of Michigan, 1960.

[4]Bulletin, Indiana, Pa.: Indiana University of Pennsylvania, Vol. 76, No. 1, February 1970, p. 298.

course is presentation-oriented and does not contain any of the protocols of the treatment model.

Selection of Instructors

Prior to the investigation the experimenter interviewed four instructors in order to determine who the control and experimental group instructors would be. Shown the models outlined earlier, three expressed preference for conventional instruction because it was what they used. The fourth instructor preferred the experimental model. He was the logical choice for experimental group instructor, but his own research barred him from taking the position. Two of the three instructors remaining were committed to half-time media production, and had no time for training as the experimental group instructor. The third man, who has a doctorate in media, was chosen as the conventional group instructor. His views on method are:

> My method of instruction is essentially like all audiovisual specialists who teach this course. Instruction should be presented clearly and with no chance for error. The best available learning resources should be used. Students should be shown the right way to do things. When they make an error, they should be corrected on the spot.

This instructor accepted the conventional model as completely descriptive of his own style. He rejected the experimental model as being too theoretical and as yet unproven. The experimenter was the experimental group irstructor.

Separate in-course unit tests, which did not contain any of the experimental test items, were used. It was essential that both methods of instruction be implemented in the manner specified earlier. Evidence that this occurred is located elsewhere in this Chapter and in Appendix C.

Sampling

Two groups of subjects were assigned to the experiment independently of the instructors' knowledge, or of knowledge of who their instructor would be. This was done by means of computerized self-registration supervised by the Registrar of the University. One day before classes met, instructors were assigned by random lots.

On the first day of class each subject was assigned to a laboratory section. Control group subjects were assigned to any laboratory of their choice. The result was heterogeneous grouping. Experimental group subjects were assigned to homogeneously grouped sections of teaching majors. Given the choice of meeting hours, 75 percent received their first choice, 20 percent their second and 5 percent were assigned by the experimenter. When asked if anyone objected to their assignment, no one did. Subjects retained their group identifications in large group meetings. A seating chart and instructor records enabled the instructor to identify subjects and their teaching majors.

On the second day of class equal-sized samples, n = 15, were drawn from the pool of all subjects. Pearson's[5] Table of Random Numbers was used for the drawing. Once drawn, samples were never varied, and none of the subjects sampled dropped the course. Drawing was necessary due to uneven numbers of n's in the teaching majors. The samples are shown in Table 1.

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[5]E. S. Pearson, Tracts for Computers, No. XXIV, London, England; University College, University of London.

Table 1. Distribution of Subjects by Teaching Major and Group

Teaching Major	Control Group	Experimental Group
Natural Science-Mathematics	15	15
Humanities	15	15
Social Sciences	15	15
Samples Combined	45	45

Experimental Treatment-BROI Method

Treatment was based on the findings of research and the recommendations of media authorities. The acronym BROI was derived from the first letter of the three words--behavioristic, response-oriented and individualization. These concepts made treatment distinctive from conventional instruction.

Classes met for three fifty minute periods per week for sixteen weeks. Instructor verbal behavior was indirect and learner-centered. It consisted chiefly of questions, cues, hints and used guided discovery techniques. Carefully worded questions, cues and hints, as have been defined for this study, were used extensively to obtain the desired, or shaped, responses and to maintain discovery. When learner responses led to a departure from the lesson, the new direction was followed to completion. The original discussion was then recovered by new questions or problematic statements, which required solutions.

Learners assisted the instructor in identifying tasks, behaviors, objectives and performances and their related criterial levels. Learners were encouraged to inquire, to test, and to unwaryingly seek applications of media in terms of their identified teaching needs.

One period per week was a laboratory session. In addition, about one half of the lectures contained laboratory type performances. These were concerned with solving problems, testing solutions and gaining competency in selecting, using, evaluating and incorporating media in lesson planning. Initial explanations were in the form of guided demonstrations. This was followed by individual guidance during practical work.

The instructor never told subjects how to perform, but guided them. Media were never used as "show and tell" devices. On rare occasions some lecture was used, but this was done because the lecture was the most desirable medium for the particular instruction involved. Also, within the experimental group, as in all groups, there were subjects who seemed to prefer the lecture method. Lecture was used, where it was appropriate, and questions and discussion were directed to these subjects. During individual instruction and private conferences, instructor used directive methods; but, this was always done as a form of individualization. The textbook served as a guide only.

The Conventional Method of Instruction for the Control Group

This method dealt with the same course content and time limits as the experimental model. The time however was utilized differently. Two hours per week were spent in large group lecture-presentations. One hour was spent in laboratory where machine operations was the chief emphasis. The instructor was concerned with information-input and was stimulus-control oriented. Subjects were heterogeneously grouped.

In lectures media were used to illustrate important points. Some students asked for clarification but learners were usually passive except for note-taking and observing. The instructor usually

asked a few review questions, but rarely, if ever, was an extended dialogue engaged in. The instructor's choice of the presentation method was deliberate. His intent was to input correct information so that learners were certain to acquire the single correct version of an idea or a performance. The textbook was a main source of knowledge.

One hour per week was spent in laboratory. Here the instructor gave detailed explanations and demonstrations which took up most of the class period. Subjects spent less than half the period in active practice. During practice, the instructor interrupted work to re-emphasize points, correct errors and make suggestions.

The instructor did not use a written model such as that used by the experimenter. The conditions of learning and related teacher behaviors were a consolidation of what the instructor had gained from training, reading, practice and inquiry of others. His method was a close copy of the outline of conventional group instruction described in Chapter I.

Comparison of Control and Experimental Group Instruction

Medley and Mitzel show that:

> . . . ultimately the best means to assess the effectiveness of teaching methods is by measurement and analysis of learner performances.[6]

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[6]Donald M. Medley and Harold E. Mitzel, "Measuring Classroom Behavior by Systematic Observation," In: Gage, Handbook, p. 249.

This procedure was used in the present investigation. The reader is referred to the null hypotheses below and to Chapter IV.

An additional comparison of methods was obtained by systematic observation of classroom verbal behavior. Audio tape samples were made of each method at bi-weekly intervals. Tapes were used since observers have full university schedules and could not be paired for live observation at regular intervals throughout the semester.

Experimenter bias was not a problem. Although aware of taping, the experimenter did not vary treatment style. Results of the pilot study showed that differential performances, which favored treatment, did occur. Unless treatment was correctly implemented, similar results would not occur during the experiment. Bias would introduce elements due to chance over which the experimenter had no control.

Four observers were trained to use systematic observation and coding of classroom verbal behavior. Observers were also trained to use the supplementary report form contained in Appendix C. This training was conducted by strict adherence to procedures recommended by Flanders. Following practice sessions on definitions and the uses of coding procedure, observers engaged in a series of eight sessions of practice coding. Emphasis throughout was on observer objectivity and reliability. They were taught to compute inter-observer reliability, thus enabling them to discover the importance of inter-observer agreement. During coding sessions observers were seated such that each could not see the others work.

Prior to coding taped observations, inter-observer reliability was determined by Scott's[7] method. Observers were assigned to categorize tapes by means of random lots. One instructor and one student coded tapes from weeks 2, 6 and 14, and the other pair coded weeks 4, 8 and 16. Weeks 10 and 12 were not used since they involved extended review sessions associated with mid-term and pre-vacation major examinations. The tapes obtained at these intervals were used in observer training sessions. Complete data on coding, reliabilities and determination of differences between methods is contained in Appendix C.

That methods were implemented as claimed, and that they differed, was determined by statistical methods. The following ratios were selected as being indicative that instructor practice was consistent with his theory of method.

Conventional Method:

1. Presentation orientation--the ratio of Direct influence (Flanders categories 5, 6 and 7) to Indirect influence (categories 1, 2, 3 and 4) is greater than 1.00.

2. Stimulus oriented--the ratio of student talk (categories 8 and 9) to instructor direct talk (categories 5, 6 and 7) is less than .25.

3. Group oriented--the ratio of student initiated talk (category 9) to all talk is less than .15.

4. Passive learner--the ratio of student talk (categories 8 and 9) to all talk is less than .15.

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[7]W. A. Scott, "Reliability of Content Analysis: The Case of Nominal Coding," Public Opinion Quarterly, No. 19, 1955, pp. 321-325.

Experimental Method:

1. Behavioral orientation--the ratio of direct influence (categories 5, 6 and 7) to indirect influence (categories 1, 2, 3 and 4) is less than 1.00.

2. Response oriented--the ratio of student talk (categories 8 and 9) to instructor direct talk (categories 5, 6 and 7) is greater than .25.

3. Individualization--the ratio of student-initiated talk (category 9) to all talk is greater than .15.

4. Active learner--the ratio of student talk (categories 8 and 9) to all talk is greater than .15.

5. Plus, each facet differs at the .05 level of significance from its conventional method counterpart.

Results of Coding

Inter-observer reliabilities are reported in Table 2.

Table 2. Inter-observer Reliabilities

Observers	A	B	C	D
A	--	.85	.72	.62
B		--	.70	.69
C			--	.85

As shown in Appendix C, inter-observer agreement on the supplementary report was very high. The four observers agreed on 96.67 percent of the observations of control group instruction, and were in 100 percent agreement on treatment. This suggests high reliability on this assessment.

Results of the coding, showed that each method differed from the other on each of the four conditions of learning at the .05 level of significance. This is shown in Table 3. Also shown in

Table 3 are data which indicate that each method was implemented on each point per the ratios selected earlier. This may be done by comparing the mean, $\bar{x}$, with the maximum likelihood estimator, L, for each row. Inspection of data in Appendix C also shows that each method differed from the other on each of the four points in all twelve codings.

Table 3. Implementation of Methods and Methods Compared

Group	Theorized Orientation	$\bar{x}$	L	H_1 : see below	H_o: $\bar{x}_1=\bar{x}_2$
Control	Presentation	52.672	26.681	$\bar{x}>1.00$ Accept	
Experimental	Behavioral	.499	.870	$\bar{x}<1.00$ Accept	
Difference				F =	10.38**
Control	Stimulus	.104	.317	$\bar{x}<.25$ Accept	
Experimental	Response	2.607	1.697	$\bar{x}>.25$ Accept	
Difference				F =	7.37**
Control	Group	.021	.137	$\bar{x}<.15$ Accept	
Experimental	Individual	.319	.256	$\bar{x}>.15$ Accept	
Difference				F =	9.51**
Control	Passive	.070	.103	$\bar{x}<.15$ Accept	
Experimental	Active	.320	.298	$\bar{x}>.15$ Accept	
Difference				F =	7.15**

** $p<.05$ $F_{.95}(1, 22) = 4.30$

Chronological Steps in the Study

The following steps occurred in chronological order and on time.

1. During the spring of 1969 a pilot study was completed.
   a. Experimental design, testing and test development were refined.
2. Tests were refined and validated during the summer of 1969.
3. The experiment was begun during the fall of 1969.
   a. Subjects had selected a teaching major, and enrolled in the course via computerized self-registration.
   b. Instructors were assigned to groups via random lots.
4. During the first two class sessions, subjects were pre-tested. Form A of the achievement test, the attitude scale and the Study of Values were administered.
5. The control group received conventional instruction for sixteen weeks.
6. The experimental group received treatment for 16 weeks.
7. Posttests were administered during the final examination period. Form B of the Achievement Test and the attitude scale were administered. The Study of Values was not readministered since the authors of the test provide data which indicate that values do not change significantly over a period of several months. These findings were also confirmed by the pilot study.
8. At the end of the posttest subjects were advised of the experiment and of the manner in which results would be reported to them.

9. The null hypotheses stated below were tested and the present report was written.

Null Hypotheses

1. There is no significant difference in achievement between experimental and control groups when measured with a two-part achievement test developed for the present investigation.
   a. There is no significant difference in achievement between Natural Science-Mathematics, Humanities and Social Science subjects of the control group.
   b. There is no significant difference in achievement between Natural Science-Mathematics, Humanities and Social Science subjects of the experimental group.
2. There is no significant difference in attitudes between experimental and control groups when measured with an attitude scale developed for the present investigation.
   a. There is no significant difference in attitudes between Natural Science-Mathematics, Humanities and Social Science subjects of the control group.
   b. There is no significant difference in attitudes between Natural Science-Mathematics, Humanities and Social Science subjects of the experimental group.
3. For both the experimental and control groups there is no significant difference in the sub-scale Allport-Vernon-Lindzey value schema scores, categorized as theoretical, for samples of Natural Science-Mathematics, Humanities and Social Science subjects.

4. For both the experimental and control groups there is no significant difference in the sub-scale Allport-Vernon-Lindzey value schema scores, categorized as aesthetic, for samples of Natural-Science-Mathematics, Humanities and Social Science subjects.
5. For both the experimental and control groups there is no significant difference in the sub-scale Allport-Vernon-Lindzey value schema scores, categorized as political, for samples of Natural Science-Mathematics, Humanities, and Social Science subjects.
6. There is no significant correlation between posttest attitude and achievement test scores for either control or experimental groups and correlations do not differ between groups.
   a. Correlations for samples of Natural Science-Mathematics subjects for each group are not statistically significant and correlations do not differ between groups.
   b. Correlations for samples of Humanities subjects for each group are not statistically significant and correlations do not differ between groups.
   c. Correlations for samples of Social Science subjects for each group are not statistically significant and correlations do not differ between groups.
7. There is no significant correlation between sub-scale value schema and posttest achievement scores for either control or experimental groups and correlations do not differ between groups.

a. Correlations of theoretical values and achievement test scores for samples of Natural Science-Mathematics subjects for each group are not statistically significant and correlations do not differ between groups.

b. Correlations of aesthetic values and achievement test scores for samples of Humanities subjects for each group are not statistically significant and correlations do not differ between groups.

c. Correlations of political values and achievement test scores for samples of Social Science subjects for each group are not statistically significant and correlations do not differ between groups.

8. There is no significant correlation between sub-scale value schema and posttest attitude scores for either control or experimental groups and correlations do not differ between groups.

a. Correlations of theoretical values and attitudes for samples of Natural Science-Mathematics subjects for each group are not statistically significant and correlations do not differ between groups.

b. Correlations of aesthetic values and attitudes for samples of Humanities subjects for each group are not statistically significant and correlations do not differ between groups.

c. Correlations of political values and attitudes for samples of Social Science subjects for each group are not statistically significant and correlations do not

differ between groups.

9. There is no significant correlation between textbook and laboratory achievement for either control or experimental groups and correlations do not differ between groups.
   a. Correlations for samples of Natural Science-Mathematics subjects are not statistically significant and correlations do not differ between groups.
   b. Correlations for samples of Humanities subjects are not statistically significant and correlations do not differ between groups.
   c. Correlations for samples of Social Science subjects are not statistically significant and correlations do not differ between groups.
   d. Sample correlations within each group do not differ.
   e. Correlations do not differ from sample to sample between groups.

Statistical Tests

Hypotheses 1 and 2 and their corollaries were tested by Analysis of Co-Variance. When overall differences were indicated, F tests were used to make individual comparisons. Null hypotheses 3, 4 and 5 were tested by Analysis of Variance. When overall differences were indicated, the Duncan New Multiple Range Test was used to make comparisons of all ordered pairs of means. Null hypotheses 6, 7, 8 and 9 were tested by calculating and determining the significance of Pearson product-moment correlation coefficients. Differences between

correlations were determined by using the Fisher z function. The .05 level of significance was used to test all hypotheses throughout the study.

Chapter IV

ANALYSIS OF DATA

Null Hypotheses 1, 1a and 1b

The statistical procedures for testing these hypotheses utilized the analysis of co-variance. The criterion was the posttest score on the achievement test, Form B. The co-variate was the pretest score on the achievement test, Form A. Three co-variance tests were made for three achievement scores, as follows: a fifty item sub-test of textbook items; a fifty item sub-test of laboratory items; and the combination of the two sub-tests to form a total score.

Tests on assumptions of homogeneity of regressions and additivity of effects, normality and homogeneity of the residual variances are based on data for these hypotheses contained in Appendix D. The null hypotheses were: 1. There is no significant difference in achievement between experimental and control groups when measured with a two-part achievement test developed for the present investigation.

a. There is no significant difference in achievement between Natural Science-Mathematics, Humanities and Social Science subjects of the control group.

b. There is no significant difference in achievement between Natural Science-Mathematics, Humanities and Social Science subjects of the experimental group.

These hypotheses were first tested with respect to total achievement scores. The analysis of co-variance is summarized in Table 4. The observed value of F = .385 indicated that there were no statistically significant differences in total achievement between the

criterion means of samples of teaching majors. A second F test revealed no statistically significant differences between control and experimental groups.

Table 4. Analysis of Co-Variance, Total Achievement Test Scores

Source	SS	df	MS	F
A(teaching major)	26.533	2	13.266	.385
B(groups)	1.957	1	1.957	.056
AB	103.839	2	51.919	
Error	2,856.533	83	34.416	
Total	2,988.862	88		

$F_{.95}(2,83) = 3.12$, $F_{.95}(1,83) = 3.97$

In a second test of achievement, data from the fifty textbook items were analyzed. The analysis of co-variance is summarized in Table 5. The observed value of F = .367 indicated no statistically significant differences in textbook achievement between teaching majors. In a second test the observed value of F = .708 indicated no statistically significant differences between control and experimental groups.

Table 5. Analysis of Co-Variance, Achievement Test, Textbook

Source	SS	df	MS	F
A(teaching majors)	12.009	2	6.004	.367
B(groups)	11.689	1	11.689	.708
AB	16.637	2	8.318	
Error	1370.260	83	16.509	
Total	1410.595	88		

$F_{.95}(2,83) = 3.12$, $F_{.95}(1,83) = 3.97$

In a third test of achievement data from the fifty laboratory test items were studied. The analysis of co-variance is summarized in Table 6.

Table 6. Analysis of Co-Variance, Achievement Test, Laboratory

Source	SS	df	MS	F
A(teaching majors)	3.320	2	1.660	.116
B(groups)	10.461	1	10.461	.736
AB	4.871	2	24.355	
Error	1178.951	83	14.204	
Total	1197.603	88		

$F_{.95}(2,83) = 3.12$, $F_{.95}(1,83) = 3.97$

The observed value of F = .116 indicated no statistically significant difference in laboratory achievement between teaching majors. In a second test the observed value of F = .736 indicated no statistically significant differences in laboratory achievement between control and experimental groups.

In view of the above findings, Null Hypothesis 1 and corollaries 1a and 1b were accepted for all achievement test scores--total, textbook and laboratory.

Null Hypotheses 2, 2a and 2b

These hypotheses stated: There is no significant difference in attitudes between experimental and control groups when measured with an attitude scale developed for the present investigation.

a. There is no significant difference in attitudes between Natural Science-Mathematics, Humanities and Social Science subjects of the control group.

b. There is no significant difference in attitudes between Natural Science-Mathematics, Humanities and Social Science subjects of the experimental group.

Raw scores, data summaries and tests of assumptions are contained in Appendix D 2. These hypotheses were tested by analysis of co-variance, summarized in Table 7 below.

Table 7. Analysis of Co-Variance, Attitudes

Source	SS	df	MS	F
A(teaching majors)	8.721	2	4.3605	.060
B(groups)	557.697	1	557.697	7.734**
AB	154.467	2	77.233	
Error	5985.076	83	72.109	
Total	6705.961	88		

**p < .05 $F_{.95}(2,83) = 3.12$, $F_{.95}(1,83) = 3.97$

An observed value of F = .060 showed that differences in attitude means between samples of teaching majors were not statistically significant. The observed value of F = 7.734 showed that control and experimental group attitude means differed at the .05 level of significance. The difference was in favor of the experimental group, as shown by the adjusted means in Table 8. Null hypothesis 2 was rejected.

Table 8. Adjusted Means, Attitudes, Control and Experimental Groups

$b = E_{xy}/E_{xx} = .326$, $\bar{G}_x = 50.555$, $\bar{G}_y = 66.027$			
		Groups	
		Control	Experimental
Pretest Means	$\bar{A}_{xj}$	48.344	52.766
Pretest Mean - Grand Mean	$\bar{A}_{xj} - \bar{G}_x$	-2.211	2.211
Posttest Means	$\bar{A}_y$	62.075	69.300
Adjusted Posttest Means	$\bar{A}_{1y} = \bar{A}_y - b(\bar{A}_{xj}-\bar{G}_x)$	60.786	68.580

As shown in Table 7 the attitude means of samples did not differ at a statistically significant level. Null hypotheses 2a and 2b were accepted.

Null Hypothesis 3

This hypothesis stated: For both the experimental and control groups there is no significant difference in the sub-scale Allport-Vernon-Lindzey value schema scores, categorized as theoretical, for samples of Natural Science-Mathematics, Humanities and Social Science subjects.

Raw scores and tests of assumptions are in Appendix D. Results of the analysis of variance test are summarized in Table 9 below.

Table 9. Summary of Analysis of Variance, Theoretical Values

Source	SS	df	MS	F
A (majors)	1,770.466	2	885.233	21.395**
B (groups)	336.400	1	336.400	8.130**
AB	20.067	2	10.033	
Error w. cell	3,475.467	84	41.374	
Total	5,602.400	89		

**$p < .05$ $F_{.95}(1,84) = 3.98$ $F_{.95}(2,84) = 3.13$

The observed value of F = 21.395 for theoretical values means across samples of teaching majors was statistically significant at the .05 level of significance. In a second test the observed value of F = 8.13 for theoretical values means across control and experimental groups was significant at the .05 level. This last result had not been theorized. In order to determine which means differed, a comparison of all ordered pairs of means was made by the Duncan New Multiple Range Test. The results are summarized in Table 10.

Table 10. Tests on All Ordered Pairs of Means, Theoretical Values

a. Ordered Means :

AB_{21}	AB_{31}	AB_{32}	AB_{22}	AB_{11}	AB_{12}
32.733	22.406	36.266	37.866	42.666	46.266

b. Differences:

	AB_{21}	AB_{31}	AB_{32}	AB_{22}	AB_{11}	AB_{12}
AB_{21}	--	.673	3.533	5.133	9.933	13.533
AB_{31}		--	2.860	4.460	9.260	12.860
AB_{32}			--	1.600	6.400	10.000
AB_{22}				--	4.800	8.400
AB_{11}					--	3.600
AB_{12}						

$s_{\bar{x}} = \sqrt{MS_{w.\ cell} / n} = \sqrt{47.374 / 15} = \sqrt{2.758} = 1.66$

c. Truncated range:

	2	3	4	5	6
$q_{.95}(r, 84)$	2.82	2.97	3.08	3.14	3.20
$s_{\bar{x}}\, q_{.95}(r, 84)$	4.681	4.930	5.112	5.220	5.312

	AB_{21}	AB_{31}	AB_{32}	AB_{22}	AB_{11}	AB_{12}
AB_{21}				**	**	**
AB_{31}					**	**
AB_{32}					**	**
AB_{22}						**
AB_{11}						
AB_{12}						

**p < .05

Legend: Samples--A_1 Natural Sciences-Mathematics, A_2 Humanities, A_3 Social Science; Groups--B_1 Control, B_2 Experimental.

Mean AB_{12} was statistically different from all other means except Mean AB_{11}, as theorized. Mean AB_{22} did not differ from Mean AB_{11}, but differed from Mean AB_{21}, results which had not been theorized. All other Means did not differ from each other as theorized. In that only eight of fifteen tests required to test this hypotheses were statistically significant, null hypothesis 3 was accepted.

Null Hypothesis 4

This hypothesis stated: For both the experimental and control groups there is no significant difference in the sub-scale Allport-Vernon-Lindzey value schema scores, categorized as aesthetic, for samples of Natural Science-Mathematics, Humanities and Social Science subjects.

Raw scores and tests of assumptions are located in Appendix D. The hypothesis was tested by analysis of variance summarized in Table 11.

Table 11. Summary of Analysis of Variance, Aesthetic Values

Source	SS	df	MS	F
A(majors)	2,054.955	2	1,027.477	20.425**
B(groups)	51.377	1	51.377	1.021
AB	43.490	2	21.745	
$Error_{w.\ cell}$	4,225.467	84	50.303	
Total	6,375.289	89		

**$p < .05$ $F_{.95}$ (1,84) = 3.98 $F_{.95}$ (2,84) = 3.13

The observed value of F = 20.425 for aesthetic values means across samples of teaching majors was significant at the .05 level of significance. These results had been theorized. A comparison of all ordered pairs of means is summarized in Table 12.

Means AB_{21} and AB_{22} did not differ from each other but differed from all other means, which did not differ from each other. Despite the fact that only eight of the fifteen tests required to test this hypothesis showed significant differences, the null hypothesis was rejected. This hypothesis was rejected because interpretation of the data indicated that performances by the Humanities subjects were significantly higher in aesthetic values scores than subjects of all other samples.

Null Hypothesis 5

This hypothesis stated: For both the experimental and control groups there is no significant difference in the sub-scale Allport-Vernon-Lindzey value schema scores, categorized as political, for samples of Natural Science-Mathematics, Humanities and Social Science subjects.

Raw scores and tests of assumptions are located in Appendix D. This hypothesis was tested by analysis of variance which is summarized in Table 13.

The observed value of F for political values scores across samples of teaching majors was statistically significant at the .05 level of significance. A comparison of all means was made by the Duncan New Multiple Range Test to determine the relationship between values and teaching major. The results are summarized in Table 14.

Table 12. Tests on All Ordered Pairs of Means, Aesthetic Values

a. Ordered	AB_{12}	AB_{32}	AB_{11}	AB_{31}	AB_{21}	AB_{22}
Means :	35.866	38.400	38.733	40.466	48.133	48.533
b. Differences:		AB_{32}	AB_{11}	AB_{31}	AB_{21}	AB_{22}
	AB_{12}	2.534	2.867	4.600	12.267	12.667
	AB_{32}	--	.333	2.066	9.733	10.133
	AB_{11}		--	1.733	9.400	9.800
	AB_{31}			--	7.667	8.067
	AB_{21}				--	.400

$s_{\bar{x}} = \sqrt{MS_{w.\ cell} / n} = \sqrt{50.303 / 15} = \sqrt{3.353} = 1.831$

c. Truncated range:		2	3	4	5	6
$q_{.95}$ (r, 84)		2.82	2.97	3.08	3.14	3.20
$s_{\bar{x}}\ q_{.95}(r,84)$		4.681	5.438	5.639	5.749	5.859
	AB_{12}				**	**
	AB_{32}				**	**
	AB_{11}				**	**
	AB_{31}				**	**
	AB_{21}					
		AB_{12}	AB_{32}	AB_{11}	AB_{31}	AB_{21}	AB_{22}

**p < .05

Legend: Samples--A_1 Natural Science-Mathematics, A_2 Humanities, A_3 Social Sciences; Groups--B_1 Control, B_2 Experimental.

Table 13. Summary of Analysis of Variance, Political Values

Source	SS	df	MS	F
A(majors)	1,209.866	2	604.933	15.268**
B(groups)	59.211	1	59.211	1.494
AB	121.689	2	60.844	
$Error_{w. cell}$	3,328.134	84	39.620	
Total	4,718.900	89		

**$p < .05$ $F_{.95}(1,84) = 3.98$ $F_{.95}(2.84) = 3.13$

The comparison of all ordered pairs of means revealed that: Mean AB_{31} differed from all sample means except Means AB_{32}, as theorized. Mean AB_{32} differed from all samples except Means AB_{11} and AB_{12}. In that only 6 of 15 tests required to test this hypothesis were statistically significant, null hypothesis 5 was accepted.

Null Hypotheses 6, a, b and c

These hypotheses stated: There is no significant correlation between posttest attitude and achievement test scores for either control or experimental groups and correlations do not differ between groups.

a. Correlations for samples of Natural Science-Mathematics subjects for each group are not statistically significant and correlations do not differ between groups.

b. Correlations for samples of Humanities subjects for each group are not statistically significant and correlations do not differ between groups.

c. Correlations for samples of Social Science subjects for each group are not statistically significant and correlations do not differ between groups.

Table 14. Tests on All Ordered Pairs of Means, Political Values

a. Ordered Means:

AB_{21}	AB_{22}	AB_{12}	AB_{11}	AB_{32}	AB_{31}
36.933	37.333	40.600	41.066	43.666	48.533

b. Differences:

	AB_{21}	AB_{22}	AB_{12}	AB_{11}	AB_{32}	AB_{31}
AB_{21}	--	.400	3.667	4.133	6.733	11.600
AB_{22}		--	3.267	3.733	6.333	11.200
AB_{12}			--	.466	3.066	7.933
AB_{11}				--	2.600	7.467
AB_{32}					--	4.867

$s_{\bar{x}} = \sqrt{MS_{w.\ cell} / n} = \sqrt{39.62 / 15} = \sqrt{2.641} = 1.625$

c. Truncated range:

	2	3	4	5	6
$q_{.95}(r,84)$:	2.82	2.97	3.08	3.14	3.20
$s_{\bar{x}}\ q_{.95}(r,84)$:	4.582	4.826	5.005	5.102	5.200

	AB_{21}	AB_{22}	AB_{12}	AB_{11}	AB_{32}	AB_{31}
AB_{21}					**	**
AB_{22}					**	**
AB_{12}						**
AB_{11}						**
AB_{32}						

**p< .05

Legend: Samples--A_1 Natural Science-Mathematics, A_2 Humanities, A_3 Social Sciences; Groups--B_1 Control, B_2 Experimental.

Raw scores and data summaries are located in Appendix D. Correlation coefficients are summarized in Table 15.

For the Natural Science-Mathematics samples there were no statistically significant correlations at the .05 level between posttest attitudes and achievements. Samples differed at the .05 level of significance on the correlation between posttest attitudes and textbook achievement. In that only one of nine tests required to test this hypothesis was significant, null hypothesis 6a was accepted.

For Humanities samples none of the correlations between attitudes and achievements were significant at the .05 level. Control and experimental group sample correlations between attitudes and total achievement differed at the .05 level of significance. In that only one of nine tests required to test this hypothesis was significant, null hypothesis 6b was accepted.

For the Social Science samples, the control group sample correlation between total achievement and attitudes was significant at the .05 level. There were no statistically significant differences in correlations between the groups. In that only one of nine tests required to test this hypothesis was significant, null hypothesis 6c was accepted.

When sample data were combined and correlations for each group calculated, only the experimental group correlation between attitudes and textbook achievement was significant at the .05 level. The difference in correlations between groups was not statistically significant. In view of these findings and those with respect to hypotheses 6a, 6b and 6c, null hypothesis 6 was accepted.

Table 15. Correlations Compared, Control versus Experimental Groups, Attitudes and Achievements

Attitudes of Samples (n=15)	Groups	Achievements											
		Total				Textbook				Laboratory			
		r	z	Diff.	C.R.	r	z	Diff.	C.R.	r	z	Diff.	C.R.
Nat. Sci.-Math.	Control	.19	.19	.43	1.08	.26	.27	.79	1.93***	.06	.06	-.10	-.24
	Experi.	-.24	-.24			-.48	-.52			.16	.16		
Humanities	Control	-.41	-.44	-.71	-1.73***	-.46	-.50	-.02	-.04	-.17	-.17	-.23	-.56
	Experi.	.26	.27			-.45	-.48			.06	.06		
Social Sciences	Control	-.51*	-.56	-.39	-.95	-.47	-.50	-.17	-.41	-.33	-.34	-.38	-.91
	Experi.	-.17	-.17			-.32	-.33			.04	.04		
Samples Combined (n=45)	Control	-.20	-.21	-.14	-.64	-.21	-.21	.22	1.00	-.13	-.13	-.19	-.87
	Experi.	-.07	-.07			-.40**	-.43			.06	.06		

***p < .05 *$r_{.95}$(n=15) = .51 **$r_{.95}$(n=45) = .29

Critical Ratio (C.R.) = difference between z scores divided by the square root of the sum of the inverse of sample degrees of freedom.

Null Hypotheses 7, a, b and c

These hypotheses stated: There is no significant correlation between sub-scale value schema and posttest achievement tests scores for either control or experimental groups and correlations do not differ between groups.

a. Coorrelations of theoretical values and achievement test scores for samples of Natural Science-Mathematics subjects for each group are not statistically significant and correlations do not differ between groups.

b. Correlations of aesthetic values and achievement test scores for samples of Humanities subjects for each group are not statistically significant and correlations do not differ between groups.

c. Correlations of political values and achievement test scores for samples of Social Science subjects for each group are not statistically significant and correlations do not differ between groups.

Raw scores and data summaries are located in Appendix D 7. Correlation coefficients for groups and samples are summarized in Table 16.

Data in Table 16 show that there were no statistically significant correlations between specified values and achievements. By inspection of z scores in Table 17, it was determined that none of the related correlations for each row in Table 17 were different at the .05 level of significance (A critical Value of $z_1 - z_2 = .67$ was required). In that no statistically significant correlations or

Table 16. Correlations Compared, Values and Posttest Achievements

Related Samples and Values		Achievements					
		Total		Textbook		Laboratory	
		Con.	Exp.	Con.	Exp.	Con.	Exp.
Nat. Sci.-Math-	r	.02	.30	-.20	.08	.27	.42
theoretical values	z	.02	.32	-.20	.08	.28	.45
Humanities-	r	-.02	-.03	.15	.09	.00	.18
aesthetic values	z	-.02	-.03	.16	.10	.00	.18
Social Sciences-	r	.06	-.11	.09	.14	-.01	-.12
political values	z	.06	-.11	.09	.14	-.01	-.12

$r_{.95}$ (n = 15) = .51

Table 17. Correlations Compared, Stated Values and Posttest Attitudes

Attitudes and Related Samples (n = 15)		Values					
		theoretical		aesthetic		political	
		Con.	Exp.	Con.	Exp.	Con.	Exp.
Nat. Sci.-Math	r	-.35	-.03				
	z	-.36	-.03				
C.R. $z_1-z_2/S.E.$	Dz		-.81				
Humanities	r			-.19	- .60*		
	z			-.19	- .69		
C.R. $z_1-z_2/S.E.$	Dz				-1.22		
Social Sciences	r					.40	-.41
	z					.41	-.44
C.R. $z_1-z_2/S.E.$	Dz						-2.08**

**p < .05

*$r_{.95}$ (n = 15) = .51

of differences between correlations were observed, null hypotheses 7, 7a, 7b and 7c were accepted.

Null Hypotheses 8, a, b and c

These hypotheses stated: There is no significant correlation between sub-scale value schema and posttest attitude scores for either control or experimental groups and correlations do not differ between groups.

a. Correlations of theoretical values and attitudes for samples of Natural-Science-Mathematics subjects for each group are not statistically significant and correlations do not differ between groups.

b. Correlations of aesthetic values and attitudes for samples of Humanities subjects for each group are not statistically significant and correlations do not differ between groups.

c. Correlations of political values and attitudes for samples of Social Science subjects for each group are not statistically significant and correlations do not differ between groups.

Raw scores and data summaries are located in Appendix E. Correlation coefficients are summarized in Table 17.

In Hypothesis 8a, correlations between theoretical values and attitudes were not significant. The correlations of each group did not differ from the other. Both correlation coefficients were negative with the higher coefficient recorded by the control group sample. In that all findings were not statistically significant, null hypothesis 8a was accepted.

In Hypothesis 8b, there was a statistically significant (.05 level) negative correlation between attitudes and aesthetic values for the experimental group humanities sample. Correlations for both groups were negative. The correlations of each group did not differ from the other. In that only one of three tests required to test this hypothesis was statistically significant, hypothesis 8b was accepted.

In hypothesis 8c correlations between political values and attitudes were not significant. The control group correlation was positive while the experimental group sample was negative. Group correlations differed at the .05 level of significance. In that only one of three tests required to test this hypothesis was statistically significant, null hypothesis 8c was accepted.

For hypothesis 8 overall, only one of three correlations between attitudes and stated value schema scores was statistically significant. With one exception, as indicated above, all correlations were negative, a main finding for this hypothesis. Only one of three tests of differences between groups was statistically significant. In view of these findings, null hypothesis 8 was accepted.

Null Hypothesis 9, a, b, c, d and e

These hypotheses stated: There is no significant correlation between textbook and laboratory achievement for either control or experimental groups and correlations do not differ between groups.

a. Correlations for samples of Natural Science-Mathematics subjects are not statistically significant and correlations do not differ between groups.

b. Correlations for samples of Humanities subjects are not statistically significant and correlations do not differ

between groups.

c. Correlations for samples of Social Science subjects are not statistically significant and correlations do not differ between groups.

d. Sample correlations within each group do not differ.

e. Correlations do not differ from sample to sample between groups.

Raw scores and data summaries are located in Appendix D. Correlation coefficients are summarized in Table 18, and z tests in Table 19.

For correlations of textbook and laboratory achievement for samples of natural Science-Mathematics subjects, the control group sample correlation was significant at the .05 level. This correlation differed from its related experimental group sample at the .05 level. In that only two of three tests required to test this hypothesis were statistically significant, hypothesis 9a was accepted.

In corollary hypothesis 9b there were no statistically significant correlations for humanities samples. Group correlations did not differ. Null hypothesis 9b was accepted.

In hypothesis 9c, there were no statistically significant correlations for social science samples. Correlations did not differ between groups. Null hypothesis 9c was accepted.

In corollary hypothesis 9d the control group natural science-mathematics sample correlation differed from both the humanities and social science sample correlations in the same group. The latter did not differ from each other. Experimental group samples did not differ from each other. In that only two of the six tests required to

test this hypothesis were significant, null hypothesis 9d was accepted.

Table 18. Textbook and Laboratory Test Correlations, Both Groups

Samples (n = 15)	B_1 Control r	z	B_2 Experimental r	z	Critical $z_1-z_2/\sigma D_z$ Ratio
A_1 Nat. Sci.-Math.	.78*	1.06	.21	.21	2.08***
A_2 Humanities	.22	.22	-.03	-.03	.61
A_3 Social Sciences	.25	.25	-.07	-.07	.78
Samples Combined (n = 45)	.48**	.53	.08	.08	1.83***

***p < .05, *$r_{.95}$(n = 15, df = 13) = .51 **$r_{.95}$(n = 45, df = 43) = .29

In hypothesis 9e, the control group natural science-mathematics sample correlation differed at the .05 level of significance from all the experimental group sample correlations. None of the other sample correlations differed. In that only three of the nine tests required to test this hypothesis were significant, null hypothesis 9e was accepted.

For null hypothesis 9 overall, the correlations between textbook and laboratory achievement for the control group combined sample was significant at the .05 level. Control and experimental group combined sample correlations differed at the .05 level of significance. In that but two of the three hypotheses required to test this hypothesis were significant, plus the findings in hypotheses a, b, c, d, and e which were accepted, null hypothesis 9 overall was accepted.

Table 19. Summary of Differences Between Samples Correlations

Samples Compared	z_1	z_2	Diff.	C.R. $H_o : r_1 = r_2 < 1.645$
$AB_{11} - AB_{12}$	1.06	.21	.85	2.08 ** Reject
$AB_{11} - AB_{22}$	1.06	-.03	1.09	2.67 ** Reject
$AB_{11} - AB_{32}$	1.06	-.07	1.13	2.77 ** Reject
$AB_{11} - AB_{21}$	1.06	.22	.84	2.06 ** Reject
$AB_{11} - AB_{31}$	1.06	.25	.81	1.98 ** Reject
$AB_{21} - AB_{22}$	.22	-.03	.25	.61 Accept
$AB_{21} - AB_{12}$	.22	.21	.01	.02 Accept
$AB_{21} - AB_{32}$	.22	-.07	.29	.70 Accept
$AB_{21} - AB_{31}$	.22	.25	-.03	.07 Accept
$AB_{31} - AB_{32}$	.25	-.07	.32	.78 Accept
$AB_{31} - AB_{12}$	.25	.21	.04	.09 Accept
$AB_{31} - AB_{22}$	.25	-.03	.28	.68 Accept
$AB_{12} - AB_{22}$	.21	-.03	.24	.58 Accept
$AB_{12} - AB_{32}$	.21	-.07	.28	.68 Accept
$AB_{22} - AB_{32}$	-.03	-.07	.04	.09 Accept
Cont. – Exp.	.53	.08	.45	2.06 ** Reject

**$p < .05$

Legend: Samples--A_1 Natural Science-Mathematics; A_2 Humanities; A_3 Social Sciences; Groups--B_1 Control; B_2 Experimental

Chapter V

SUMMARY AND CONCLUSIONS

Nature of the Problem, Origin and Importance

In this study the effectiveness of an experimental instructional method was compared with a conventional instructional method as used in a first course in media for pre-service teachers. Effectiveness was compared along dimensions provided by three variables--achievement, attitude change and value schema held by teachers. The problem was identified by the experimenter based upon his experience, reading and teaching of media courses.

In teaching media courses, the experimenter noted that the first course in media is comprehensive, eclectic and loosely organized. It consists of an accumulation of related topics bound by the common thread that they use audio and visual means to improve learner receipt of messages. It is neither based on, nor does it deal adequately with relevant research findings, particularly those of media research.

In observations of pre-service teacher interns, the experimenter noted wide variation in the effectiveness with which interns used media. Some used no media while others used it effectively and with a great deal of innovation. Interns appeared to imitate the practices and attitudes toward media of their major professors. Interns who had completed a first course in media tended to use media more effectively than those who had not. All interns were imitative; used media as a presentation means in lieu of lectures; and generally neglected to have their pupils interact adequately with the media and the messages.

Innovations in a first course in media attempted by the experimenter provided suggestions for further research. It was found that many learners could pass the course simply by reading the textbook; but, they could not always apply what they had learned. Instead of studying machines throughout the semester, learners were able to achieve criterion on 25 machines in ten hours of practice offered during a three day teaching aids clinic. Pre-service teachers who had been pre-trained by the experimenter were able to teach a selected chapter from the textbook to their classmates. Examination grades indicated that these teachers were as effective as the instructor in training pre-service teachers in certain media competencies. They also had taught media while using media under controlled conditions.

A review of the literature showed that the problem investigated in this study had not been previously reported upon. Several surveys were reported between 1930 and 1950. Since 1950 several experiments with machines operations laboratories have been reported. Conventional instruction appears to have no valid basis in research, theory or philosophy. It consists of practices which are inconsistent with current emphases in education. Treatment lies in contrast to it.

Carried to a successful conclusion, the study reported on here is important for several reasons. It will be at least one report on a study of a first course in media. The treatment, which was based on research findings, will have been tested and some estimate of its validity can be made. The study represents one report on a performance-based approach in one teacher education course.

Specific Statement of the Problem

The effectiveness of treatment and conventional methods of instruction was compared. Conventional instruction stressed presentation of content, was stimulus-oriented, was concerned with large group approaches, and tended to make the learner passive. Treatment tended to be dichotomous to the conventional method. It used a behavioral approach, stressed learner response, emphasized individuation, and made the learner an active participant in both the instruction and in learning.

The effectiveness dimension was determined by measurement of two achievement, one attitude, and three value schema variables. A pretest-posttest control group design was used.

Procedure of the Investigation

A pilot study was completed during the spring of 1970. In the pilot study, experimental design, tentative hypotheses, statistical design, and control of variables were examined. The results of the pilot study are located in Appendix E. The pilot study confirmed that some unknown relationship between teaching major, values and performance as measured by achievement and attitudes existed. A direct statistical comparison of the pilot and the present study is not possible. Refinements suggested by the pilot study were incorporated in design, measurement and statistical test aspects of the present study.

The present study was conducted without deviation from the procedures and chronological schedule described in Chapter III. All of the subjects sampled remained in the experiment to its conclusion.

One reaction occurred among the experimental group subjects. These subjects expressed the concern that their classmates in independent sections were exposed to different procedures than those which they were experiencing. This reaction had been anticipated by the experimenter. A lesson on study of the research basis of mediated instruction was included in the course content. See list of topics in Appendix A. This lesson was based on complete extracts of relevant media research reports drawn from Gage's Handbook of Research on Teaching.[1] In addition to solving the reaction problem, the extracts provided a continuous basis for individualizing media instruction in terms of the subject and his teaching major. No evidence of further reaction was noted. At no time did subjects ask if an experiment was in progress.

Prior to the investigation two forms of an Achievement Test and one Attitude Scale were developed and validated. Content validity of the instruments may be determined by comparing them with the contents of the course, objectives for the course, and the contents of typical textbooks used in such courses /See Appendix A/. Content validity was established via the expert opinion of two authorities /at independent institutions/ closely involved with offering a first course in media. Empirical validity and reliability were estimated and furnished to these evaluators along with course

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[1]Ned L. Gage, Handbook of Research on Teaching, American Educational Research Association, Chicago: For the Association, Rand Mc Nally and Company, 1963.

content and objectives. Both authorities provided favorable reports on the content validity of all instruments. See Appendix B for their reports.

Findings and Discussion

The findings reported in Chapter IV suggest the decisions and discussion presented below. These relate to the questions and theoretical hypotheses posed in Chapter I.

Theoretical hypothesis 1 -- Subjects in an experimental group will score significantly higher in achievement than will subjects of a control group when measured with a two-part achievement test developed for the present investigation.

a. Subjects of the Natural Science-Mathematics sample of the control group will score significantly higher on achievement than will subjects of the Humanities and Social Science samples.

b. In the experimental group there will be no significant difference in achievement between the Natural Science-Mathematics, Humanities and Social Science samples.

There were no significant differences in achievement between groups for the measures of total, textbook and laboratory achievement. Theoretical hypothesis 1 was rejected. Control group sample means did not differ on any of the three measures of achievement. Theoretical hypothesis 1a was rejected. Experimental group sample means did not differ on any of the three measures of achievement. Hypothesis 1b was accepted. Although hypotheses 1 and 1a were rejected, the experimental treatment was not invalidated. The findings are interpreted to mean that treatment was as effective as conventional

instruction in the three achievement measures.

Hypotheses 1b assumes importance as findings reported elsewhere confirm that treatment provides homogeneous results among diverse samples of subjects. Conventional instruction tends to provide heterogeneous results. The implication of this finding is that conventional instruction may not make adequate provisions for different teaching majors.

Theoretical Hypotheses 2 -- Subjects in an experimental group will score significantly higher in attitudes than will subjects of a control group when measured with an attitude scale developed for the present investigation.

a. Subjects of the Natural Science-Mathematics sample of the control group will score significantly higher on attitudes than will subjects of the Humanities and Social Science samples.

b. In the experimental group there will be no significant difference in attitude scores between Natural Science-Mathematics, Humanities and Social Science samples.

It was found that the experimental group scored significantly higher in attitudes than did the control group. Theoretical hypothesis 2 was accepted.

Tests of the significance of these differences showed that control group samples did not differ from each other: experimental group sample means did not differ from each other. Theoretical hypothesis 2a was rejected. Theoretical hypothesis 2b was accepted.

The implications of these findings are that: treatment provided for greater attitude change, and for more homogeneous results

among teaching majors, as theorized. Conventional instruction also provided homogeneous results, a finding which had not been theorized, and the implications of which are not known. Inspection of data in Appendix D shows that the control group Natural Science-Mathematics attitudes Mean changed the least. It was less than and differed significantly from all experimental group sample means plus the control group Humanities sample mean. In that subjects of this sample performed well on all other tests, the lower attitudes means may imply that they felt no need to change attitudes toward media--they were content with the conventional instruction. In the experimental group the higher terminal attitude scores and the homogeneous results imply that treatment was more effective than conventional instruction, as theorized.

Theoretical Hypothesis 3 -- Pre-service teachers classified as Natural Science-Mathematics teachers score significantly higher in theoretical values than do pre-service Humanities and Social Science teachers.

Differences, as theorized, were found; but one discrepancy was observed. The control group Natural Science-Mathematics sample theoretical values mean differed from all other control group sample means, but it did not differ from the experimental group humanities sample mean, as needed. This error may be due to the experimental group Humanities sample mean performance on the theoretical values sub-test. This sample also differed from its related control group sample mean, which had not been theorized. This appears to be an inflated score due to subjects' particular performances. The Study of Values is a forced choice instrument. When a subject scores high

on one or more sub-tests, one or more other sub-test scores are lower. This may have occurred here.

In order to resolve this discrepancy, all sample means were compared with weighted national norms for the theoretical values sub-test. See Appendix D. It was found that both control and experimental Natural Science-Humanities sample theoretical values means differed from weighted norms at the .05 level of significance. None of the other sample means differed from national norms. In view of this finding, theoretical hypothesis 3 was accepted.

Theoretical Hypothesis 4 -- Pre-service teachers classified as Humanities teachers score significantly higher in aesthetic values than do pre-service Natural Science-Mathematics and Social Science teachers. It was found that the Humanities sample aesthetic values mean for both groups did not differ from each other. They each differed from all other sample means, which in turn did not differ from each other. Theoretical hypothesis 4 was accepted.

Theoretical Hypothesis 5 -- Pre-service teachers classified as Social Science teachers score significantly higher in political values than do pre-service Natural Science-Mathematics and Humanities teachers as measured by the Allport-Vernon-Lindzey Study of Values. On the political values sub-test the control group Social science sample differed from all other means except the related experimental group sample, as theorized. A discrepancy occurred in that the experimental group Social Science sample political values mean did not differ from the Natural Science-Mathematics sample mean in both groups. This error may be due to the performances of Natural Science-Mathematics sample subjects of both groups on the political values sub-test.

This discrepancy may also reflect the increased concerns with ideas political observed in contemporary college students.

In order to resolve the discrepancy all means were compared with national norms. See Appendix D 5. Both Social Science sample means differed from national norms at the .05 level of significance. All other means did not differ from national norms. In view of these findings, theoretical hypothesis 5 was accepted.

Theoretical Hypothesis 6 -- There is a significant postive correlation that exists between posttest attitudes and achievements for both the control and experimental groups.

a. The experimental group Natural Science-Mathematics sample correlation of attitudes and achievements will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

b. The experimental group Humanities sample correlation of attitudes and achievements will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

c. The experimental group Social Science sample correlation of attitudes and achievements will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

Among Natural Science-Mathematics samples, all control group correlations were positive but treatment group correlations were negative except for the correlation of laboratory test and attitude

scores. The control group sample correlation between textbook test and attitudes was positive and significantly higher than that for the experimental group sample. In that only one of nine tests provided statistically significant findings, theoretical hypothesis 6a was rejected. The differences noted, however, may suggest that conventional instruction does favor the Natural Science-Mathematics subjects.

Among Humanities samples none of the correlations was significant at the .05 level. The experimental group sample correlation of attitudes and total achievement was positive and significantly higher than the related control group sample correlation. Since only one of nine tests was statistically significant, theoretical hypothesis 6b was rejected.

On correlations of attitudes and achievements for Social Science samples, all experimental group correlations were higher but not statistically different than the like correlation for the control group sample. Only the control group correlation between total achievement test and attitudes scores was significant. It was negative. Since only one of nine tests provided statistically significant results, theoretical hypothesis 6c was rejected.

Correlations for the experimental group were more homogeneous for each class of achievement and attitude tests studied, than the control group correlations. In correlations of attitudes and textbook achievement all samples of both groups except the Natural Science-Mathematics control group sample were negative, approaching the .05 level of significance. All three Natural Science-Mathematics sample correlations were low but positive. All other control group sample correlations were negative with five of six approaching the .05

level of significance. Implications drawn from the data are that correlations of attitudes and achievements are negative, and that conventional instruction favors the Natural Science-Mathematics subject, as theorized.

Experimental group samples provided high negative correlations between textbook achievement and attitudes, but low positive correlations between laboratory test and attitude scores. The implication is that treatment tended to be effective in theorized directions, i.e., induced learning via laboratory rather than textbook learning.

In view of the above findings, theoretical hypothesis 6, overall, was rejected. The tendencies for correlations to be negative, for treatment to provide improved results and for conventional instruction to induce higher positive results for the control group Natural Science-Mathematics are all in theorized directions. These results are related to findings in tests of hypotheses 2, 8 and 9.

Theoretical Hypothesis 7 -- There is a significant positive correlation that exists between value schema and posttest achievement for both the control and experimental groups.

a. The experimental group Natural Science-Mathematics sample correlation of theoretical values and achievements will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

b. The experimental group Humanities sample correlation of aesthetic values and achievements will be significantly higher than the like correlations for the related control group sample and both correlations will be statistically significant.

c. The experimental group Social Science sample correlation of political values and achievements will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

None of the correlations between values and posttest achievement approached the .05 level of significance. Five of 18 correlations were negative and 8 others were almost zero. None of the sample correlations differed from each other at the .05 level of significance. Theoretical hypotheses 7, 7a, 7b and 7c were rejected.

The implication of these findings is that the established relationship between subjects value schema and choice of teaching major is not related to achievement in a first course in media in correlations of values and achievements.

Theoretical Hypothesis 8 -- There is a significant positive correlation that exists between value schema and posttest attitudes for both the control and experimental groups.

a. The experimental group Natural Science-Mathematics sample correlation of theoretical values and attitudes will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

b. The experimental group Humanities sample correlation of aesthetic values and attitudes will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

c. The experimental group Social Science sample correlation of political values and attitudes will be significantly higher than the like correlation for the related control group sample and both correlations will be statistically significant.

In correlations of attitudes and theoretical values for the Natural Science-Mathematics samples both correlations were negative but not at a statistically significant level. Groups did not differ from each other. Theoretical hypothesis 8a was rejected.

The Humanities sample correlations of aesthetic values and attitudes for both groups were both negative. The experimental group sample correlation was significant at the .05 level. Groups did not differ. Theoretical hypothesis 8b was rejected.

In correlations of attitudes and political values for the Social Science samples, the control group sample correlation was positive but the experimental group sample was negative. Both correlations approached the .05 level of significance. Groups differed at the .05 level of significance. Theoretical hypothesis 8c was rejected.

In view of the above findings theoretical hypothesis 8 overall was rejected. Except for the control group Social Science sample all correlations between values and attitudes were negative, and were especially so for the experimental group samples.

Theoretical Hypothesis 9 -- There is a significant positive correlation that exists between textbook achievement and laboratory achievement for the control group but not for the experimental group and correlations are significantly different between groups.

a. The control group Natural Science-Mathematics sample correlation of posttest textbook and laboratory achievement will be significantly higher than the like correlation for the related experimental group sample and only the control group sample correlation will be statistically significant.

b. The control group Humanities sample correlation of textbook and laboratory achievement will be significantly higher than the like correlation of the related experimental group sample and only the control group sample correlation will be statistically significant.

c. The control group Social Science sample correlation of textbook and laboratory achievement will be significantly higher than the like correlation of the related experimental group sample and only the control group sample correlation will be statistically significant.

d. Sample correlations within each group do not differ from each other.

e. Correlations do not differ from sample to sample between groups.

In the correlation of textbook and laboratory achievement, only the control group Natural Science-Mathematics sample correlation was significant at the .05 level. It differed at the .05 level of significance from the correlations of all samples in both groups. Theoretical hypothesis 9a was accepted.

None of the remaining samples correlations were statistically significant; nor did related sample correlations differ from each

other at the .05 level. Theoretical hypothesis 9b was rejected. Theoretical hypothesis 9c was also rejected.

In that two of the six tests required to test hypothesis 9d were statistically significant, theoretical hypothesis 9d was rejected.

In that three of the nine tests required to test hypothesis 9e were statistically significant, theoretical hypothesis 9e was rejected.

For combined samples of each group, only the control group correlation was significant and it differed from the experimental group correlation at the .05 level of significance. In view of these findings, theoretical hypothesis 9 overall was accepted, but this result cannot be generalized to samples except as indicated in the results reported for corollary hypotheses a, b, c, d and e.

The most significant aspect of these results is that the control group Natural Science-Mathematics sample correlation differed from all other samples in both groups. This result is closely related to similar findings in hypothesis 6. The performance of this sample as recorded in correlations of textbook-laboratory test, textbook-attitude test results and laboratory-attitude test results implies that conventional instruction favors this sample. These results may tend to validate the view held by certain authorities that conventional instruction favors the physical science concept of instructional technology.

The fact that all control group sample correlations of textbook and laboratory achievement were positive and differed widely from related experimental group sample correlations implies differential effectiveness between methods. Although the sign direction was reversed [control group sample correlations tended to be negative] the results

of tests of hypothesis 6 also imply differential effectiveness for conventional and experimental methods.

Summary and Implications

Treatment equalled but did not surpass conventional instruction in inducing textbook, laboratory and total achievement growth. It excelled in changing subjects' attitude toward intended use of media. Treatment tended to provide more homogeneous results among samples of teaching majors than did conventional instruction.

Conventional instruction was superior only on the performance of the control group Natural Science-Mathematics sample correlations of textbook and laboratory achievement, and textbook achievement and attitudes. The results of tests of hypotheses 6a, and 9 tended to support the view of some authorities that conventional instruction favors the physical science concept of instructional technology.

Although values were demonstrated to be correlated with specified teaching majors, as theorized; they correlated at low or negative levels with textbook and laboratory achievement and with attitudes.

Since treatment equalled or excelled conventional instruction for all samples except the control group Natural Science-Mathematics sample /a theory which was confirmed/ it may be inferred that treatment has been validated.

Suggestions for Further Research

The effectiveness of the treatment suggests further research into the performance-based BROI model and the notions upon which it is based. An attempt should be made to isolate the conditions of

learning and the related teacher behaviors which caused the effects observed.

From the outset, the experimenter experienced persistent difficulty with the comprehensive, eclectic and loosely organized nature of the media course which was examined in this study. Further research might be concerned with fewer media competencies studied over a shorter period of time. Instructional objectives, criterial performance levels and criteria-referenced measurement of one or two competencies might be used in such a follow-up study.

Inspection of raw scores and means in Appendix D revealed that subjects performed best in attitude change, laboratory achievement and textbook achievement in that order. Since the presentation approach of conventional instruction is textbook learning oriented; and, since treatment, which did not provide for textbook learning, equalled conventional instruction in effectiveness of textbook learning, the textbook emphasis seems suspect. A multiple regression study or a multi-variate comparison of textbook, laboratory and attitude performances in a first course in media may be useful for further defining the effectiveness of each type of learning in terms of the treatment used. To this end, treatment might be modified in an attempt to create growth in laboratory learning which is more comparable to attitude change. Textbook learning should be given less emphasis.

Differential performances /some of which were not significant at the .05 level of significance/ in textbook, laboratory and attitude learning were observed among samples of teaching majors in the control group. In the experimental group results for samples were homogeneous,

and subjects' attitudes toward intended use of media were significantly higher than those of the control group. Further study might be concerned with such questions as: What media competencies does each class of teaching major need? how may teaching majors be given some training in all media competencies, while being provided options to emphasize that training which is most appropriate to their needs and teaching majors? what level of competency in each option is appropriate for each teaching major? what methods and activities are appropriate for training in each option for each level?

The findings of this study suggest that a new first course in media which is performance-based should be designed and tested. Performances would include selection, production, use and evaluation of materials, lessons and systems of instruction. Learning to operate machines could be via self-instructional laboratory exercises. Textbook learning /cognitive learning/ could be by computer-assisted-instruction and dial-access-and retrieval modes. Although not reported in this study, the experimenter found that considerable time must be devoted to individual and to small-group conferences which are directly concerned with the needs of individual teachers. Such time should be a part of the course format.

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APPENDIX A

COMPARISONS OF METHODS, OBJECTIVES, PROTOCOLS AND INSTRUCTORS

1. Course Content and Proportionate Emphasis to Relevant Sub-topics

The first course in media for pre-service teachers is comprehensive. Its general content is prescribed by university officials. They seek to have the course conform with state department of education requirements, practices on other campuses and with what is contained in textbooks for the course.

In order to further define the content four textbooks were analyzed. An effort was made to determine what topics were regarded as important, and the amount of space and time devoted to each. The number of pages which each author devoted to the topic was recorded. The pages per topic per author were summed and divided by the total number of pages in the four books. The resultant percentage was used to determine the following:

1. The amount of time devoted to the topic in the course.

2. The number of behavioral objectives, test items and activities in the course.

It may be noted that there are slight variations in percentages and the number of test items developed for each topic. This is due to a decision made by the experimenter. The four texts tend to emphasize textbook learning, and do not suggest performance type experiences. These were added by the experimenter. Appropriate test items were developed and added.

The texts which were analyzed are:

A. James W. Brown, Richard B. Lewis and Fred F. Harcleroad, AV Instruction: Media and Methods, Third Edition, New York: McGraw-Hill Book Company, 1969.

B. Edgar Dale, Audiovisual Methods in Teaching, 3rd Edition, New York: Holt, Rinehart and Winston, Inc., 1969.

C. Walter A. Wittich and Charles F. Schuller, Audiovisual Materials: Their Nature and Their Use, 4th Edition, New York: Harper and Row, 1969.

D. James S. Kinder, Using Audio-Visual Materials in Education, New York: American Book Company, 1962.

Textbook A was adopted for use by teachers who take the course. The control group instructor used the textbook but varied his course content from both the text and from that used by the experimenter.

Table 20. Proportion of Space Devoted to Sub-Topics in a First Course in Media

Chapters		Textbooks (# of pages)						% per Experimental Items		
No.	Title	A	B	C	D	Sum	%	Behavioral Objectives	Achievement Tests, A,B	Attitude Scale
1.	Education and Communications	25	102	25	32	184	8.01	8	8	14
2.	Systems Instruction	26	80	23	34	163	7.09	7	7	20
3.	Instructional Materials Ctr.	36	16	--	--	52	2.26	5	4	4
4.	Texts and Reference Books	26	28	--	27	81	3.52	4	3	2
5.	Programmed Materials	22	40	14	--	76	3.31	8	6	2
6.	Supplementary Materials	26	--	19	--	45	1.96	4	3	2
7.	Graphics	47	60	41	26	174	7.57	5	4	2
8.	Still Pictures	52	45	60	56	213	9.27	8	8	6
9.	Overhead Projectors	24	--	20	--	44	1.91	4	4	4
10.	Films (projectors)	52	40	54	92	238	10.35	8	10	6
11.	Television	28	27	23	41	119	5.18	4	5	4
12.	Audio Materials	56	33	46	56	191	8.31	12	7	4
13.	Real Things and Models	28	31	30	27	116	5.05	1	4	2
14.	Community Resources	20	26	27	21	94	4.09	3	3	4
15.	Displays and Boards	28	26	80	74	208	9.05	4	7	4
16.	Creative Construction	22	54	--	18	94	4.09	3	4	2
17.	Pictures and Photography	26	--	--	23	49	2.13	4	3	2
18.	Demonstrations, Experiments	18	25	--	--	43	1.87	4	3	2
19.	New Media and the Future	23	23	33	37	116	5.05	3	7	14
	Total Pages Per Each Text	587	654	495	564	2298	100.00	100%	100%	100%

2. Topics Selected for Each Lesson, Experimental Treatment

Week		Title
1	1*	-Organize class, administer attitude scale and values tests.
	2*	-Administer Form A Achievement test, and organize laboratory.
	L**	-Define Learning Resources. Have class develop objectives, and related behaviors and activities for the course.
2	1	Education today and some major innovations of promise.
	2	Role and scope of a first course in media.
	L	-Develop an operational definition of the course by performance sampling of all major media to be learned.
3	1	-Developing a theory of classroom communications.
	2	Theories of instruction and of learning and how media are used to implement them.
	L	-Learn to operate the filmstrip previewer and Standard 500.
4	1	Introduction to programmed instruction and its theory.
	2	-Write linear, branching and CAI frames and short programs.
	L	-Laboratory exercise in using and evaluating P/I and CAI.
5	1	-Writing objectives and related lesson plans.
	2	-Lesson planning and systematic instruction using media.
	L	-Learn to operate SVE, Graflex SM and Autoload Filmstrip projectors.
6	1	-Administer 1st test.
	2	Feedback on Test 1. Develop filmstrip evaluation criteria.
	L	-Evaluate a filmstrip in subjects teaching major.
7	1	Graphics are used to represent reality.
	2	-Learning the diazo process for making overhead transparencies.
	L	-Learning to operate and use Carousel and TDC slide projectors.
8	1	Summarize work on graphics, diazo process and still pictures.
	2	Discuss printed materials, supplementary resources and the Instructional Resources Center concept and how to use it.
	L	-Demonstration and work on subjects' own diazo projects.
9	1	The Instructional Materials Center and how to use it.
	2	-Fundamentals of audio and learning to use the Clasette TR.
	L	-Learning to operate the RHEEM and VM Tape recorders.

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*1 Large group lesson
*2 Large group lesson, same as 1
**L refers to Laboratory
- refers to a performance based session

Week		Title
10	1	-Using displays--vertical, horizontal and area exhibits.
	2	-2nd test.
	L	-Operation of record players, listening centers and patch cords.
11	1	Feedback on test 2. Discuss the remainder of course. Individuate.
	2	-Learning to operate and to use the motion picture projector.
	L	-Use tape recording to check voice quality. Tape a mini-lesson related to lesson planning sessions, and evaluate it.
12	1	Learning to conduct demonstrations and experiments.
	2	Using community resources as teaching and learning activities.
	L	-Learning to operate RCA 1600 projector.
13	1	Television and its applications in the classroom.
	2	-How the classroom teacher uses television.
	L	-RCA, Bell and Howell projector operation and use.
14	1	Develop criteria for selecting, using and evaluating 16 mm film.
	2	Creative construction, writing and teaching.
	L	-Learning to operate Graflex, Kodak and film loop projectors.
15	1	-Evaluate educational films in subjects' own teaching major.
	2	-What does research say about media materials and methods.
	L	-Video-tape and evaluate a mini-lesson involving the use of the diazo produced transparency which subject completed.
16		-Final examination, two hours, POSTTEST. Administer Form B of Achievement Test and re-test attitudes. Inform subjects of the experiment, its status and future reports which they may see.

- indicates a performance-based session.

3. 75 Behavioral Objectives Used with Course Topics

(Types: T = Textbook; A = Affective; and, L = Laboratory)

Type		Objective
T	1.	Teacher understands and replicates knowledge of data regarding numbers and types of schools, pupils and quantities of audio-visual machines and innovations.
T	2.	Teacher replicates knowledge of new school architecture and equipment gained from films and reading.

Type		Objective
T	3.	Teacher replicates knowledge of Dale's "AV Cone of Experience."
I	4.	Teacher modifies Dale's Cone to fit his anticipated use of media, materials, machines and techniques.
L	5.	Teacher plans his ideal classroom, inclusive of seating, work-study and storage areas, and provisions for media.
T	6.	Teacher understands and replicates knowledge of programmed instruction and teaching machines.
TA	7.	Teacher acknowledges and replicates knowledge of the distinctive contributions to programming made by Skinner, Crowder and Pressey.
TA	8.	Teacher discusses the role of Skinnerian theory in both programming and media research.
L	9.	Teacher uses and/or operates a "scramble" book, programmed text and teaching machine.
L	10.	Teacher writes a brief linear program which stresses stimulus demand and shaping provisions.
L	11.	Teacher writes a short branching program including provision for "washback" and "Washahead."
TL	12.	Teacher develops a theory and model of instruction adapted from the several theories studied and from his ideas.
T	13.	Teacher replicates knowledge of systems instruction model.
A	14.	Teacher appreciates the importance of a model or a theory as a base upon which to plan courses and instruction.
T	15.	Teacher replicates knowledge of Schramm and Berlo models.
TL	16.	Teacher contributes to class developed instructional model.
TAL	17.	Teacher evaluates class developed model of instruction and adapts it to his professional needs.
TL	18.	Teacher replicates knowledge of Bloom *et al.*, "Taxonomy of Educational Objectives," and provides examples of learning tasks, objectives and related activities.
TL	19.	Teacher replicates details of Mager's method of preparing instructional objectives, giving examples of objectives and criterial performances. He prepares outline of a lesson plan.
L	20.	Teacher tells how he will use an Instructional Materials Center.

Type		Objective
T	21.	Teacher replicates knowledge of the organization, content and procedures employed in instructional materials centers.
T	22.	Teacher replicates knowledge of how to use district, regional and state level instructional materials centers and their catalogues.
T	23.	Teacher replicates knowledge of the make-up and purpose of textbooks, reference books and related printed materials.
TL	24.	Teacher contributes ideas to a class developed criteria for evaluating textbooks and printed materials.
L	25.	Teacher evaluates a public school text which he may use.
T	26.	Teacher replicates knowledge of how to obtain free, inexpensive and supplementary materials.
L	27.	Teacher writes for free materials which he will use in teaching.
AL	28.	Teacher contributes to a class evaluation of the usefulness of free, inexpensive and supplementary materials.
T	29.	Teacher replicates knowledge of criteria for still pictures and picture mounting inclusive of design, form, line, color, harmony and content.
L	30.	Teacher selects pictures and other graphics for objectives which he has prepared. Class developed criteria are used.
L	31.	Teacher mounts pictures and graphics using dry and wet mount techniques.
T	32.	Teacher replicates knowledge of optical systems.
L	33.	Teacher sets up and operates filmstrip, slide, combination F/S-slide and opaque projectors using the proper sequence and procedures, including: uncovering, activating, prefocusing, loading, adjusting, operating, unloading, cooling, recovering and storing the projectors and their related software.
TAL	34.	Teacher contributes elements to a class developed criteria for evaluating pictures, slides and filmstrips.
L	35.	Teacher evaluates a filmstrip in his teaching area.
T	36.	Teacher replicates knowledge of graphs, posters, charts and diagrams.

Type		Objective
L	37.	Teacher copies a picture using infra-red heat process.
L	38.	Teacher makes a ditto master plus a transparency using the infra-red heat process.
L	39.	Teacher selects an instructional communication problem; sketches a transparency intended to solve the problem; inks the vellums, prints and mounts acetates to form a multi-overlay color separated overhead projection transparency.
L	40.	Teacher sets-up and operates Bell and Howell, RCA, Graflex, and Kodak Pageant 16 mm motion picture projectors, inclusive of: uncovering, activating, pre-focusing, pre-sound, adjusting, threading, operating, reversing, adjusting, unloading and storing both hard and softwares.
L	41.	Teacher operates film loop projectors.
L	42.	Teacher splices a broken film.
TAL	43.	Teacher contributes elements to a class developed criteria for evaluating educational films.
L	44.	Teacher evaluates an educational film in his teaching major. He conducts class evaluation of film which he uses.
L	45.	Teacher writes an evaluation of a commercial film of his choice, commenting on script-writer, producer and director manipulation, style, use of symbolism, color, sound, story and plot.
L	46.	Teacher sets up and operates Casette, Webcor, Wollensak and Voice of Music single, double and four track tape recorders.
L	47.	Teacher sets up and operates record player.
L	48.	Teacher sets up and operates a Language Master.
L	49.	Teacher sets up and operates a listening center.
L	50.	Using a patch cord, teacher connects in pairs or multiples a television receiver, tape recorder, record player and listening center in combinations for recording, amplifying, and playback.
L	51.	Teacher dubs verbal or music segments to a tape.
L	52.	Teacher operates a tape-slide projection.

Type		Objective
L	53.	Teacher operates a record-slide and/or filmstrip presentation.
L	54.	Teacher evaluates a tape, recording and audio-card set.
L	55.	Teacher evaluates his tape recorded voice for speech qualities.
TL	56.	Teacher writes and tapes a mini-lesson and evaluates it for speech and communication criteria selected by the class.
TA	57.	Teacher replicates definitions of ITV, ETV, CCTV, CATV, UHF, VHF, AM, FM and related electro-magnetic spectral data.
T	58.	Teacher replicates knowledge of using television in class.
L	59.	Teacher evaluates a commercially produced TV documentary.
TL	60.	Teacher contributes elements to criteria for creativity.
T	61.	Teacher tells how to implement a creative learning session.
TL	62.	Teachers contributes elements to a protocol for demonstrating and experimenting.
T	63.	Teacher replicates knowledge of the scientific method.
LA	64.	Teacher evaluates demonstrations presented in class.
T	65.	Teacher defines community resources and lists their uses.
L	66.	Teacher suggests criteria for planning, conducting, follow-up and evaluating field trips, resource speakers and the like.
T	67.	Teacher replicates knowledge of picture, model and realia.
L	68.	Teacher mounts pictures for display, projection and use.
L	69.	Teacher lists topics suitable for pictures and graphics.
TL	70.	Teacher uses models, mock-ups and realia appropriately.
T	71.	Teacher defines IPI, CAI and Dial Access and Retrieval.
TAL	72.	Teacher discusses concepts of accession and retrieval.
TAL	73.	Teacher selects a topic for a short unit, identifies tasks and behaviors, writes objectives and performance criteria.
TAL	74.	Using the plan (73 above), teacher selects films, filmstrips, tapes, records and related software items.
TAL	75.	Teacher takes a field trip to a local Instructional Materials Center and evaluates the trip.

4. Lesson Protocols with Related Teacher Behaviors in Sentence Form

I. Introduction

The lesson is identified by having the class recall what topic they had selected in past sessions. Learners are motivated by asking them pre-questions to arouse interest, and soliciting their views of the topic. Task and behaviors are specified by having learners describe performances involved in the lesson. Behavioral objectives are prepared by learners who state behaviors and the criterial performances for each.

II. Main Body of the Lesson

Begin the lesson by posing the lesson title as a problem, a question or as a performance to be completed. Develop the lesson by using guided discovery cues and hints to lead learners into verbalization of possible solutions. Convert textbook learning to laboratory by having the learners test their solution to the problem. Review by having learners demonstrate steps in the performance mastered.

III. Assignment

Assignment comes from the learners who suggest the next logical topic to be learned. They identify task, behaviors, possible objectives and performance criteria. Learners and instructor seeks to find topics in related textbook discussion.

Sample lesson plan used with the above protocols

Task: Develop and use criteria for selecting, using and evaluating filmstrips in a lesson.

Behaviors:

1. identify good and bad features of a demonstration filmstrip lesson.
   a. identifies relevant evaluative criteria.
2. plan a lesson involving the use of a filmstrip.
   a. state tasks, behaviors and performance criteria.
   b. write behavioral objectives.
   c. specify plan for using filmstrips in the lesson, including time to be used, rate of projection, reading captions, discussion and follow-up activities.

Behavioral Objectives:

1. Learner evaluates a demonstration filmstrip lesson, specifying good and bad features of the lesson.

   a. Judgements are converted into criteria for evaluating filmstrips and filmstrip lessons.

2. Learner plans a lesson involving a filmstrip, inclusive of:

   a. selects a learning task, and specifies the behaviors involved in mastering the task.

   b. writes behavioral objectives and performance criteria.

   c. identifies learning activities, including use of a filmstrip, which will facilitate the achievement of the objectives.

   d. prepares a plan for using a filmstrip, including

      (1) number of frames and rate to be projected.

      (2) how captions will be read.

      (3) plan for having class interact with message.

      (4) follow-up activities to be used.

I. Introduction

Have the class specify the lesson topic selected in the last session. With virtually no introduction, the instructor presents the 24 frame filmstrip, "How to Use Filmstrips in Teaching." The filmstrip is shown hurriedly, with little comment, poor focus and generally poor technique for using a filmstrip in teaching.

II. Main Body of the Lesson

Motivate the class with the question, "How did you like my little filmstrip lesson?" Ask for comments, pro and con. Guide the class through an identification of all good and bad features of the lesson and of the filmstrip. Write learner comments on the chalkboard. Revise these comments to form criteria for evaluating filmstrips. Compare these criteria with those listed in standard textbooks.

Have the class rework the demonstration lesson. Learners state task, behaviors, performance criteria and activities to be engaged in. Learners suggest the behavioral objectives to be used. Learners next develop a lesson involving a filmstrip which they are to select.

III. Assignment

Ask learners to identify the next logical activity in the present unit of study. Inevitably this turns out to be a recommendation that learners select, use and evaluate a filmstrip. Learners are asked to obtain a filmstrip related to the lesson they were planning, and bring it to the next laboratory session.

5. Experimental Group Laboratory Protocols and Related Behaviors

a. Identify the task by having learners recall the problem which they previously selected for today's session.

b. Behaviors, objectives and performance criteria are identified by asking learners to recall what they previously identified.

c. Demonstrate the performance to be learned, by guiding learners through the act. On the initial guided demonstration do not comment except to insure that performance is done correctly. Repeat the guided demonstration, but stop the demonstration at each step, and clearly identify the criterial performance for that step.

d. Learners complete the exercise during 60 to 80 percent of the class time; instructor provides inidividual guidance.

e. The lesson is reviewed by having learners reiterate or complete behaviors in proper sequence and at criterial levels.

f. Assignment comes from suggestions of learners. The topic selected by a show of hands.

Sample Lesson Plan for Experimental Group Laboratory Protocols.

Task: Conduct the class through an evaluation of a filmstrip in your teaching major.

Behaviors:
a. learner recalls good and bad features of filmstrips, and can state criteria for filmstrip usage.
b. learner previews and presents a filmstrip lesson.
c. learner conducts class in an evaluation of his F/S.
d. learner clarifies and supplements class critique.

Behavioral Objectives:
1. Learner states and justifies his use of specific criteria for selecting, using and evaluating filmstrips.

2. Learner previews a filmstrip and evaluates it in terms of class-developed criteria.

3. Using proper projection and presentation technique, learner shows his filmstrip to the class.

4. Learner conducts the class through a point-by-point critique of his filmstrip and his filmstrip technique. Appropriate evaluative criteria are discussed.

I. Introduction

Remind learners of the lesson which they previously selected. Learners recall criteria which they previously selected. Learners each preview filmstrips which they have brought to class.

II. Main Body of Lesson

Selected learners illustrate filmstrips, filmstrip usage and showing technique for various teaching areas (time permitting). Each learner conducts the class through an evaluation of the filmstrip which he has shown.

III. Review

During previews and showings the instructor has identified filmstrips and filmstrip frames which are highly illustrative of good and bad and of criterium selected for evaluations. As a form of review, identified filmstrips are re-shown and the class is asked to identify the criterium best illustrated by the filmstrip. Discussion is conducted.

IV. Assignment

Learners are asked to identify possible learning tasks for the next sessions. A topic is selected by a show of hands.

6. Control Group Large Group Protocols and Related Behaviors

Introduction

The instructor begins the lesson by re-stating the topic which he has previously assigned. The class is motivated by instructor telling the class why the topic is important and why it should be of interest to the learner. Lesson objectives are usually implied or stated by the instructor, as follows: "Today we want to learn how to select media by using catalogues and guides, because you will have to do this someday soon."

Main Body of the Lesson

The instructor presents the topic by lecturing and using media to illustrate the statements made. Reinforcement is sought by having learners replicate the content. Lacking a response, the instructor will itemize the important points to be learned. The lesson is reviewed by the instructor.

Assignment

The instructor specifies the topic and the related pages of the textbook which are to be studied.

Sample Lesson Plan for Control Group Large Group Sessions

Topic: Using filmstrips in teaching a lesson.

Objective: Teach learner how to select use and evaluate filmstrips.

I. Introduction

Remind the class of the previously assigned lesson. State the above objective and explain why the topic is important and of interest to the learner.

II. Main Body of the Lesson

Using an overhead projector, present a list of advantages, then of disadvantages of using filmstrips in teaching. Have the learners comment on these lists and those in the textbook. Discuss the list of hints on how to use filmstrips which is in the text. Describe a number of samples drawn from teacher observations and experiences.

III. Review

Have the class recall the advantages, disadvantages, and hints given.

IV. Assignment

Tell learners to obtain a filmstrip in their teaching area and prepare to evaluate it in the next laboratory session.

7. Control Group Laboratory Protocols and Related Teacher Behaviors

a. Identify the topic and behaviors by telling the class what will be done during the hour.

b. Explain the procedures by an overview of the lesson.

c. Explain and demonstrate the exercise.

d. Learners complete the exercise while instructor observes their work and assists where needed.

e. Review the lesson if time permits.

f. Announce the next topic and pages to be studied in the text.

Sample Lesson Plan for Control Group Laboratory Session

Task: Evaluate a filmstrip in your teaching area.

Materials: A filmstrip obtained from instructional materials center.

Objective: Using criteria list issued to learners, each learner sets up projector, previews and evaluates a filmstrip.

Introduction

The instructor reminds learners of the topics and directs them to set up projectors. Issue criteria as set-ups are made. Explain what each point in the evaluation sheet is, how the learner is to interpret it, and how he is to fill out and turn in the form. Add commentaries if you care to. This is a graded exercise.

Main Body

Learners set up projector, preview filmstrip, re-run the filmstrip evaluating it point-by-point, and turn in their written evaluation at the end of the period. Projectors and materials are stored.

Review

Ask learners how they liked the exercise. Remind them of the critical importance of evaluating filmstrips.

Assignment

Tell learners the topic, chapter and page reference for next lesson.

8. A Summary of Control and Experimental Group Instructor Backgrounds

Control Group Instructor

Colleges and Degrees--B.A., Hiram College, Ohio; M.A., Ohio State University; Ed.D., Indiana University, Terminal Degree in Media.

Experience--Encyclopedia Britannica Films, Assistant Director of Research, 2 years; Public School Teacher and Supervising Principal, 9 years; College Professor, 14 years, Department Chairman of Learning Resources Department.

Memberships--National Education Association, Pennsylvania State Education Association, Department of Audiovisual Instruction, Association for Higher Education, Pennsylvania Learning Resources Association, Phi Delta Kappa, and American Association of University Professors.

Other--Age 52, married, 3 children

Experimental Group Instructor

Colleges and Degrees--B.S., M.Ed., Pennsylvania State University; Professional Certificate, University of Colorado; Ph.D. Dissertation in progress, Pennsylvania State University, Terminal Degree to be in Secondary Education.

Experience--Public School Teacher and Administrator, 8 years; College Professor, 11 years, Associate Professor of Learning Resources.

Memberships--All those listed by the control group instructor plus American Educational Research Association and National Society for the Study of Education.

Other--Age 48, married, three children

9. Comparison of Grading Patterns, Fall Term 1969-1970

Final Examination	N	Mean	S.D.
Control Group Instructor	91	67.96	20.27
Experimental Group Instructor	99	68.60	19.55

Final Grades by Percent	A	B	C	D	E
Control Group Instructor	13.2	42.5	34.0	2.8	7.5
Experimental Group Instructor	14.9	42.1	38.0	.8	3.3

APPENDIX B

TESTS DEVELOPED FOR THE STUDY

Learning Resources Examination Form A

There are four alternative responses to each of the 100 items in this test. Select the best answer, as indicated, i.e., either the one correct answer in the four, or the one wrong answer, as the case may be.

T 1. In general, one of the major problems in classroom communication is

a. teaching by the unqualified.
b. lack of communication equipment.
c. lack of experienced teachers.
d. teaching to a single sense.

T 2. Instructional technology as defined by James Finn means:

a. business corporations who are producing educational technology.
b. all of the mechanical devices being used in education.
c. a way of organizing instructional resources while attending to the interaction of science, art and human values.
d. teaching machines used as the basic method in a lesson plan.

T 3. The teacher's greatest contribution will come if (select wrong one)

a. he is familiar with and knows how to use secondary sources of evaluative information about ready-made learning aid. resources.
b. is personally acquainted with and uses every learning.
c. has skill in evaluating media and recording these judgements.
d. can use his knowledge of student needs, backgrounds and abilities to select and use most suitable learning resources.

L 4. If we limit a discussion of communication to effective communication, the most important link in the process is the

a. source.
b. message.
c. channel.
d. receiver.

T 5. Philip W. Jackson says that educational technology can improve the quality of education through all but which one of the following

a. greater alterations in the social character of learning.
b. greater individualization of instruction.
c. greatly enriched library of teaching resources.
d. greater possibility of cost reductions.

T 6. Most authors in psychology and AV Education insist that conceptual learning can be ultimately traced back to past

a. emotional experiences.
b. first-hand experiences.
c. verbal experiences.
d. vicarious experiences.

L 7. Which pair of the following learning tasks are most difficult to teach

a. facts and ideas.
b. attitudes and interests.
c. wisdom and ideals.
d. habits and skills.

L 8. Which one of the following is the best definition of communication

a. to make common.
b. to participate.
c. neither is.
d. a plus b is.

T 9. Reflective thinking, problem solving and creative activity (select the one best answer)

a. are learned with facts.
b. are undertaken once facts are learned.
c. are a side benefit with facts.
d. are as important as facts.

L 10. The purpose of writing behavioral objectives is (select wrong one)

a. to specify what outcomes are sought in instruction.
b. to get the maximum content into a class period.
c. to provide a basis for selecting activity and method.
d. to provide a guide for the evaluation plan.

L 11. When educators are able to clearly specify the educational objectives they will quickly see that

a. the objective may be met in several ways depending on the student.
b. certain resources will best achieve the objective.
c. one route clearly leads to the objective.
d. a regional motion-picture library will improve instruction.

L 12. In selecting experiences for students, the teacher must consider

a. the characteristics of the students.
b. the objectives of the lesson.
c. the procedures which most likely insure learning.
d. all of these.

T 13. The text identifies four phases or stages usually involved in implementing instruction. These are: A. developmental, B. introductory, C. summarizing and D. organizational. What is the correct order in which these phases occur?

a. A, B, C, D (as above).
b. B, D, A, C.
c. B, A, D, C.
d. B, C, A, D.

L 14. One of the following is in error. The X projector is used in the Y part of the room.

a. opaque - middle to rear.
b. filmstrip - rear of room.
c. overhead - front of room.
d. slide - middle to rear.

T 15. If a student says that he does not understand, this probably means that (select one best answer)

a. he was at fault.
b. the media was at fault.
c. the communication process broke down.
d. the teacher was at fault.

T 16. The least important use of an Instructional materials center by the classroom teacher is

a. maintenance and repair of AV machines.
b. clarification of teaching goals and selection of media.
c. assistance in making and selecting learning resources.
d. evaluation of suitability of facilities and resources.

L 17. School districts seeking guidance for innovative curriculum development might best turn to the _____ Materials center

a. regional.
b. local.
c. state.
d. national.

L 18. The main function of the Production Center is

a. to catalog materials.
b. to develop criteria for selecting materials.
c. to create materials not available commercially.
d. to evaluate materials prior to purchase.

T 19. Regional Instructional Materials Centers generally service

a. two or more school districts.
b. only one state.
c. a multi-state region of the nation.
d. regional sections of a state.

T 20. Which statement is false?

a. workbook assignments must be practical and encourage problem solving.
b. comics and cartoons are most useful because of the humor which they bring into classroom routine.
c. the best encyclopedia assignments require students to solve problems.
d. newspapers and magazines are very useful in teaching current events, propaganda analysis, etc.

T 21. If the textbook version accomplishes as much as the film version

a. the film makes no outstanding contribution to learning.
b. the film should be used first.
c. the film should be used last.
d. the film still makes a great contribution to learning.

T 22. Among printed materials, which one of the following has been found to be least effective and usable in classroom teaching

a. textbooks and programmed texts.
b. workbooks and encyclopedias.
c. supplementary and enrichment books.
d. paperbacks and hand-out literature.

T 23. A principal finding of research on programmed instruction is that

a. programmed textbooks are usually markedly superior to conventional books covering the same material.
b. students tend to learn at least as much from programmed materials as from other methods of instruction.
c. students learn better from programmed materials used in teaching machines than from those in book form.
d. programmed materials are most effective for "total" rather than "supplementary" teaching purposes.

T 24. The two main methods of programmed learning, linear and branching (adaptive) were developed by

a. Skinner and Frye.
b. Lumsdaine and Glaser.
c. Schramm and Pressey.
d. Skinner and Crowder.

T 25. A technique which can be built into some self-instructional devices to take into account the intelligence of the student is

a. programming.
b. vanishing.
c. branching.
d. prompting.

L 26. Each step or item in a programmed teaching unit is called a

a. program.
b. frame.
c. cue.
d. branch.

T 27. Which one of the following is not an advantage of programming

a. improve level of student performance.
b. reduce incidence of student failure.
c. they are easily and rapidly produced.
d. reduce amount of required teaching time.

L 28. From the point of view of this course, the greatest weakness of most programmed instruction programs is that

a. too much dependence upon the written word and little use of visual, auditory and kinesthetic materials is made.
b. programs do not fit the curriculum.
c. steps (frames) are too small and repetitious.
d. too much chance for cheating and dawdling exists for students.

T 29. Supplementary materials are used for all but one of the following

a. furnish material for bulletin board displays.
b. eases the pressure on the teacher for devising her own materials.
c. develops students critical evaluation skills.
d. classroom collections of study prints can be obtained this way.

T 30. Which of the following criteria for teacher evaluation of free materials is in error.

a. does the material present useful information?
b. does the material tend to enhance effective communication.
c. does the material effectively complement the text.
d. does the material present all information on the topic.

T 31. Producers and distributors of free instructional materials say that such materials have all but one of the following advantages

a. are prepared by people with expert knowledge of the topic.
b. provide special knowledge often not found elsewhere.
c. advertising information is of benefit to the students.
d. provide up-to-date information on topics versus out-of-date material often contained in textbooks.

L 32. Materials which communicate facts and ideas clearly and succinctly through combinations of words, pictures, drawings, etc. are called (Select the best answer)

a. posters.
b. graphics.
c. diagrams.
d. charts.

T 33. Diagrams and graphs (select one most correct answer)

a. are quite abstract and pupils must be taught how to get meaning from them.
b. can be understood by primary children if they are capable of understanding the concepts involved.
c. which involve great abstraction cannot be understood before high school age.
d. are less useful than other more important devices.

T 34. The term graphics

a. is applied to the art of expressing ideas in lines, pictures, sketches and diagrams.
b. is applied by teachers when making many materials that go on feltboard, bulletin boards, charts, posters, etc.
c. represents a form of literacy, i.e., a person who cannot get meaning from graphics suffers from a form of illiteracy.
d. all of the above are correct.

T 35. Graphics that have been prepared by using sulphite construction paper will give longer and more satisfactory service than graphics using standard quality construction papers because the paper is

a. fadeless.
b. heavier ply.
c. more acceptable to adhesives.
d. moisture proof.

L 36. Many "2x2" slide projectors may be adapted to use which one of the following

a. 16mm films.
b. 35mm films.
c. 64mm films.
d. 140mm films.

L 37. A zoom lens (select one best answer)

a. can make a close object appear far away.
b. can enlarge the picture on the screen when using the Carousel projector.
c. can make distant objects appear close-up.
d. all of the above.

L 38. In operating the filmstrip projector, if parts of two pictures appear on the screen, _____ is necessary.

a. rethreading.
b. framing.
c. focusing.
d. elevating.

L 39. A filmstrip cannot be shown in which one of the following.

a. Standard 500.
b. SVE Instructor.
c. TDC.
d. Carousel.

L 40. With respect to its intended usage, a good filmstrip is (select wrong one).

a. relevant and up-to-date.
b. has contiguity and movement continuity.
c. is explicit and succinct.
d. is appropriate and accurate.

L 41. The advantages of the opaque projector are (select one wrong)

a. can be used in a normally lighted room without darkening.
b. the small amount of heat from the lamp would not damage delicate materials.
c. can project many kinds of materials with a minimum of preparation or effort.
d. can project solid objects with 3D focus.

L 42. When you face the screen, a slide is placed in the slide carrier so that as you stand at the rear of the projector, it reads

a. This way.
b. ·ʎɐM sᴉɥT
c. ·ʇᴉs ɯɐʞ sᴉɥT
d. yaW sihT.

T 43. The average cost of filmstrips is about

a. $1.00 - 2.00 B&W, $2.00 - 4.00 Color.
b. $3.00 - 6.00 B&W, $5.00 - 10.00 Color.
c. $10.00 - 20.00 B&W, $20.00 - 40.00 Color.
d. $50.00 - 75.00 B&W, $75.00 - 150.00 Color.

L 44. Which one of the following is the least advantageous quality of teacher-made overhead projection transparencies

a. easy to compose.
b. easy to store.
c. easy to revise.
d. easy to use.

L 45. The purpose of the scotch magic tape on the technivellum master is that it

a. makes the area around your press-type letters more transparent.
b. strengthens the paper.
c. prevents the press-type letters from buckling or sticking.
d. prevents the paper from burning.

L 46. In producing diazo transparencies, one uses

a. ammonia vapor.
b. a semi-darkened room.
c. an infra-red light.
d. the electrostatic process.

L 47. Of the following colored media, which cannot be used to show color on an overhead transparency

a. cellophane paper.
b. tempera paint.
c. translucent ink.
d. colored sheet-plastic.

L 48. The film loop (select one wrong answer)

a. is best used by small viewing groups.
b. deals with a single concept.
c. typically contains sound.
d. may be used in a large darkened room.

L 49. A film taken at 64 frames per second and projected at normal speed is an example of

a. time-lapse photography.
b. slow-motion photography.
c. animation photography.
d. speeded-up photography.

L 50. The projector is put in reverse

a. when one wants to run the film back on the original reel after it has been shown.
b. to show a film that has been rewound backwards.
c. when one wants to show a portion of film a second time and yet not have to take the film out of the projector.
d. all of the above are correct.

L 51. Which of the following is the least comprehensive film source

a. NICEM Index.
b. Educational Media Index.
c. the textbook for a course.
d. commercial catalogues.

L 52. If the exicter lamp is not on during motion picture projection

a. the sound and picture will not be synchronized.
b. the sound will be distorted.
c. there will be no sound.
d. there will be no picture on the screen.

L 53. The lower loop of film on a sound motion picture projector should be of the manufacturer's specified size because

a. it provides slack for the intermittent motion of the film.
b. it keeps the film properly framed.
c. it helps keep the film correctly aligned to the sprockets.
d. it correctly synchronizes sound and picture.

L 54. The steps in using a film are all correct, but which one is least used in the actual teaching-learning situation.

a. follow-up and evaluation.
b. showing and discussing a film.
c. selection and ordering.
d. preview and preparation to show.

L 55. When motion picture images float on the screen providing no defineable picture, the cause is

a. the film is not engaged on the sprocket wheel.
b. the film is not engaged on the intermittent claws.
c. the film is not properly placed around the sound drum.
d. the film loops are too large.

L 56. When threading the Kodak Pareant, two unique points are

a. the full reel goes on the left when running; and the reels are exchanged for rewind.
b. the white line on the manual threading knob must be turned toward the projectionist; and a special loop-sizer is used to form the bottom loop.
c. the first part of the threading operation is automatic, then you thread the film around the rollers onto the take-up reel.
d. pre-amp occurs when you turn on the volume and pre-focus is done with one selector switch.

L 57. On the model of the Bell and Howell motion picture projector on the table before you, the amplifer is turned on at

a. the switch labeled #1.
b. the switch labeled #2.
c. the switch labeled #3.
d. the switch labeled #4.

T 58. Which organization was established to serve as headquarters for programming of affiliated non-commercial ETV stations

a. National Broadcasting Company (NBC).
b. National Education Television (NET).
c. Joint Council on Educational Television (JCET).
d. National Association of Educational Broadcasters (NAEB).

L 59. Television discrimination in selecting program

a. is something each student should develop by himself.
b. should be taught only in the home.
c. is synonymous with the development of good taste in reading.
d. should be taught only in the classroom.

T 60. Because video tape can be purchased in several widths, the following factors must be considered in purchasing a television system (select one wrong answer)

a. width can affect the quality of the taped replay.
b. generally the wider the tape, the more expensive the system.
c. generally the wider the tape, the less portable the equipment.
d. width can affect the size of the TV studio.

T 61. At present it appears that TV

a. will very likely replace the classroom teacher in the future.
b. will occasionally supplement and enrich the curriculum.
c. will use the services of an expert teacher to present TV lessons, thus freeing the classroom teacher for individualized instruction, group work and pupil activities.
d. will remain a very insignificant tool in the educational system.

T 62. Which of the following is not practical for use with the tele-lecture technique (select the best answer).

a. presenting visual materials correlated with the tele-lecture.
b. obtaining feedback and questions from students to lecturer.
c. presenting handwritten notes simultaneously with the lecture.
d. presenting verbal material of an extensive sort.

T 63. Students must be trained in all but one of the following listening skills

a. direct and maintain attention and follow directions.
b. analyze and evaluate what was heard.
c. listen for information, appreciation and recreation.
d. listen for main ideas, sequences and relevant information.

T 64 Which one of the following is the least justifiable use of tape recorders.

a. speech activities such as student practice in listening to and recording his own voice.
b. hearing speakers who cannot be present in the classroom.
c. teacher recording her lesson when other duties keep her from class.
d. recording and replay of speeches or plays for purposes of critical analysis.

L 65. The material on magnetic tape which records magnetic patterns is

a. aluminum oxide.
b. iron oxide.
c. a coating of plastic.
d. iron granules.

L 66. Electronic eyes, dial type meters, and neon glow lamps are used on tape recorders for which of the following purposes.

a. to assist the operator in controlling the tone.
b. to guide the operator in volume setting.
c. to show when the machine is operating at proper speed.
d. to indicate when the recording heads need to be cleaned.

T 67. Listening speed, as compared with talking speed, is

a. half as great.
b. as great.
c. twice as great.
d. four times as great.

L 68. When duplicating tapes, the tone control of which of the following machines will modify the quality of the final tape

a. the machine recording the duplicate.
b. the machine playing the original tape.
c. neither one.
d. either one.

T 69. Research on "listening" indicates that an interested audience will retain immediately

a. 90% of the material.
b. 75% of the material.
c. 50% of the material.
d. 25% of the material.

T 70. A simulation device (such as a driver-training mock-up) requires all but one of the following.

a. that equipment move and operate like the real thing.
b. an exact replica of the real thing.
c. the same motion and operations as the real thing.
d. that the learner use the device as though it were real.

L 71. Maps may be used to depict all but which one of the following

a. earth surface features.
b. social, economic, political or cultural distributions.
c. ethnographic and demographic data distribution.
d. ektographic and technological data distribution.

L 72. A classroom teacher should not use a map unless it has the following characteristics (select the one most incorrect one).

a representation of the earth's surface to scale.
b. a key for interpreting data.
c. pin point accuracy in locations.
d. easily read names, captions and labels.

T 73. A mock-up is usually

a. larger than reality.
b. smaller than reality.
c. of variable size with respect to reality.
d. the same size as reality.

T 74. The chief purpose in using the following community resources is (select one most incorrect response)

a. a resource speaker provides authoritative first hand information.
b. school camping is used effectively in biology and nature study.
c. a field trip is a substitute for film or other learning experiences.
d. a survey gives student practice in gathering data.

T 75. Which of the following is not an advantage of field trips.

a. they bring the community and the schools closer together.
b. real source materials can be examined and concrete evidence obtained.
c. oral and written expression may be stimulated.
d. an interesting community figure can be interviewed.

T 76. In case of accidents on field trips

a. the school is always responsible.
b. the teacher is responsible unless the parents signed a release.
c. the teacher is responsible even in proven negligence.
d. the teacher and school are always responsible.

L 77. The least valuable use of bulletin boards is

a. to facilitate class study of single copy materials.
b. to stimulate student interest.
c. to save time.
d. to teach students how to communicate visually.

L 78. One of these boards is not used much as a display surface. It's two companions are OK, but it isn't.

a. fibre board, felt board, magnetic board.
b. bulletin board, flannel board, cork board.
c. chalkboard, wall board, flannel board.
d. peg board, hook 'n loop board, masonite board.

L 79. A good layout of materials on a board is one where (wrong answer)

a. items are harmonious.
b. items are balanced.
c. items are all inclusive.
d. items are in configuration.

T 80. The one best or chief value of collections is

a. students get a better picture of ideas from complete collections
b. students learn of the vast number of things.
c. students learn the sources of things.
d. students learn to collect and to evaluate things.

L 81. Which of the following is not true of chalkboards (select one worst)

a. buff colored chalk on dull green surface is best.
b. a back and forth erasing motion is best.
c. chalkboards in front and at sides of room are best.
d. a chalkboard plus cork rail above it is best.

L 82. The most common and effective displays used in education are

a. in school museum cases and tables.
b. on bulletin and similar boards.
c. on the chalkboard.
d. on hallway surfaces.

L 83. Which of the following statements is not true of flannel boards

a. they are easy to mount and to store.
b. they are inexpensive and easy to construct.
c. it is easy to manipulate materials on them.
d. they can be very colorful.

L 84. For most efficient learning the student should be reinforced

a. immediately.
b. within a few hours after making the response.
c. sometime before the course ends.
d. it makes no difference whether the student is reinforced.

T 85. The least spontaneous creative classroom activity is

a. puppetry.
b. scroll theaters.
c. classroom constructions.
d. staging plays.

T 86. Creative activity (select the one wrong answer)

a. permits student expression of thoughts, feelings and actions.
b. enhances reinforcement of students' view of a process or idea.
c. is based on affective type objectives.
d. is based on its potential for expression of student needs.

T 87. Which statement is false about classroom creative experience

a. students learn from it.
b. it is expensive.
c. lesson planning is easy.
d. it is motivational.

L 88. Flat pictures (select one wrong answer)

a. are an effective interest-getting device.
b. help the reader interpret ideas.
c. often are a form of abstraction.
d. to be most effective, pictures must go beyond the life and interests of the learner.

T 89. Things which are too abstract or theoretical for effective comprehension by the average learner can be visualized by

a. animation.
b. photomicrography.
c. change-speed photography.
d. creative repatterning of information.

L 90. Pictures may be used to (select one wrong answer)

a. help the learner recognize particular objects.
b. help the learner to determine details in a picture.
c. help the learner to draw inferences.
d. help the learner to get the right answer.

T 91. Which one of the following is not a sound objective for conducting a demonstration

a. focus class attention upon basic procedures.
b. provide example of correct materials and procedures.
c. students learn to manipulate processes or procedures.
d. reduce length of trial and error in learning a procedure.

T 92. The foremost value of student conducted classroom experiments is

a. students learn how things are discovered.
b. students re-enact an experiment exactly as discovered.
c. students learn the process of experimentation.
d. students learn materials used in experiments.

T 93. Steps in the scientific method and problem solving method are (which one is not exactly correct) (disregard the order)

a. conduct the experiment.
b. state hypotheses about the problem.
c. identify and define a problem.
d. report conclusions.

T 94. The text reports all but which one of the following as support for increased use of media in evaluation of learning outcomes.

a. they require less verbal skill to grasp meanings of the test stimuli.
b. they improve the learner's ability to see relationships between various parts of test problems.
c. they improve some students morale by causing them to feel that they can better demonstrate their true abilities.
d. they generally guarantee the learner will answer more questions correctly than when questions are presented verbally (or in writing).

L 95. As a modern public school teacher I am least likely to do very much of one of the following

a. make large group resentations.
b. lecture in an auditorium.
c. use small group and independent study techniques.
d. use my regular classroom as a planning and work area.

T 96. Research indicates which of the following is not a proven contribution of educational media.

a. they make learning more permanent.
b. they contribute to growth and meaning, hence to vocabulary.
c. they hold a high degree of interest for students.
d. they reduce the number of teachers required.

T 97. A computer-assisted device, the Edison Responsive Environment Instrument (EREI), properly called the "talking typewriter" was developed by

a. Thomas Edison, New Jersey.
b. Omar Kayam Moore, Pittsburgh.
c. C. J. Edison, Maryland
d. University of Illinois Computer Center.

T 98. Select the one of the following as the least important reason for using kits in learning.

a. student-oriented approach.
b. factual accuracy of details in the kit.
c. learning by investigating.
d. gaining understanding by active involvement.

T 99. Recent trends bearing importantly upon school programs include all but one of the following

a. increasing individualization of instruction.
b. increase of knowledge.
c. greater use of new media.
d. narrowing of school curricula.

T 100. One center for the development and trial application of academic games is

a. Kent State University, Ohio.
b. NOVA High School Academic Games Project, Florida.
c. Lindquist Center for Academic Games, Michigan.
d. New School of Social Research, Maryland.

Learning Resources Examination Form B

T 1. Brown, Lewis and Harcleroad's view of educational media includes all but which one of the following

a. no one learning resource, process or experience is sufficient for learning all subjects, skills or attitudes, etc.
b. no one teacher can or should propose to use every learning resource ever devised or invented.
c. no one resource or learning experience is good or bad because they are concrete or abstract.
d. no one learning task can be classified as active or passive on the basis of classroom experiences or activities.

L 2. There are five steps in selecting media. Which one of the following sequences is in the most logical order

a. preliminary information search, preview and review, establish purposes, test in classroom and record evaluations.
b. preliminary information search, establish purpose, preview and review, test in classroom and record evaluations.
c. establish purpose, preliminary information search, preview and review, test in classroom and record evaluations.
d. establish purpose, preview and review, preliminary information search, test in classroom and record evaluations.

T 3. One of the following is in error or out of order

a. a source has knowledge, attitudes, culture, etc.
b. message is concerned with code and treatment.
c. content refers to the senses.
d. receiver has the same qualities as the source.

T 4. Which one of the following does not describe the student today

a. increased number of students.
b. increased mobility of students.
c. increased range of student needs.
d. increased homogeneity of student abilities.

L 5. Who should control the multi-media teaching-learning system?

a. the AV specialist.
b. the administrator.
c. the teacher
d. a learning psychologist.

T 6. The lowest levels of learning are

a. affective and psychomotor.
b. factual and imitative.
c. habit and skill formation and development.
d. problem solving and reflective thinking.

T 7. One of the following is not a type or class of teaching objectives

a. affective.
b. developmental.
c. psychomotor.
d. cognitive.

T 8. Concepts are

a. verbal forms that aid understanding.
b. classifications of experiences.
c. visual images of direct experiences.
d. logical subdivisions of subject matter.

L 9. A properly stated instructional objective will exhibit all but one of the following characteristics

a. a statement as to what the learner will be doing when he demonstrates proficiency or achievement of the objective.
b. definition of the conditions under which this performance will occur.
c. the content or subject matter that is to be recalled.
d. definition of the level of performance that is acceptable.

T 10. The three principal classes of objectives identified in the text include all but which one of the following?

a. knowledge and information.
b. attitudes and appreciations.
c. character development and mental discipline.
d. skills and performances.

L 11. The least important of the following aspects of lesson planning is

a. identifying learning tasks and writing suitable objectives.
b. identifying student level of development and needs.
c. developing lesson content and selecting materials, media, etc.
d. preparing questions and identifying probable directions the lesson will take.

L 12. I would best use which resource in a first lesson on how to use a new equation in mathematics

a. motion picture film.
b. tape recording.
c. overhead projector.
d. filmstrip with lecture or recording.

L 13. Typically the slide projector is used in which part of a room

a. side of the room.
b. front of room.
c. middle of room.
d. back of the room.

L 14. In answering a question about a two-step process which you had explained via an overhead projector transparency, a student supplies correct data but the data are applied to the wrong steps. This communication breakdown is probably due to

a. receiver and decoding.
b. channel and sign vehicle.
c. source and encoding.
d. the media and the means.

T 15. The Instructional Materials Center does not usually provide the teacher with which one of these

a. film and filmstrip rentals.
b. filmstrip, slide and transparency purchases.
c. video tapes and video tape recorders.
d. resource speakers and field trips.

T 16. The local school district IMC usually provides all but one of the following

a. organizes community resources for educational purposes.
b. produces subject matter educational films.
c. produces pictures, graphics, video tapes, etc.
d. purchases, rents or borrows films, filmstrips, tapes, etc.

T 17. The typical school district IMC devotes most of its effort to

a. making transparencies, mimeographing, etc.
b. consulting with teachers.
c. assisting administrators in developing a media program.
d. purchasing and administering learning resources (media).

T 18. The typical school district IMC devotes most of its efforts to all but which one of the following.

a. supplying teachers with their learning resources needs.
b. training teachers to produce graphics, etc.
c. using all available resources and means to meet the instructional resources needs of the schools.
d. volume buying and use to reduce per item costs.

T 19. Which of the following statements is false

a. typically the traditional lecture was a means of providing students with readings of texts which were in limited supply.
b. the necessity for careful editing of a motion picture usually makes it a superior medium of communication to a textbook.
c. in the long run there is nothing which a textbook communicates which cannot be done better by some other medium.
d. typically the textbook is a version of a series of lectures which are embellished pictorially and graphically.

T 20. One of the following is not an advantage of a textbook

a. prescription of teaching-learning objectives.
b. individualization of instruction.
c. tutorial contributions.
d. improvement of teaching practices.

L 21. You may use a 3M Secretary infra-red copier to make all but one of the following

a. a transparency from an inked original.
b. a ditto master from an inked original.
c. none of these.
d. both of these (a and b)

L 22. In using a linear program, one must remember that each student, regardless of background and ability, must (one correct answer)

a. proceed through each and every step of the program.
b. have adaptive frames for points needing clarification.
c. consent to constructing responses from separate manuals.
d. all of the above.

T 23. The pioneer who first worked with self-scoring devices and is considered a forerunner to the programmed learning movement is

a. Skinner.
b. Pressey.
c. Lumsdaine.
d. Glaser.

T 24. The psychological theory on which programmed instruction is based could be called

a. gestalt.
b. introspection.
c. stimulus-response.
d. functionalism.

L 25. Which is not an example of a self-instructional device.

a. programmed text.
b. Pressey-type automatic scoring machine.
c. mimeographed material with a punchboard scoring device.
d. self-threading motion picture projector.

L 26. Skinner's programming technique requires that the student

a. choose from several possible answers.
b. react to several-color-coded responses.
c. discriminate among refined responses associated with push buttons on the machine.
d. construct an answer on the basis of his experience.

T 27. In selecting a teaching machine a key factor is

a. cost per machine.
b. size of machine.
c. availability of replacement parts.
d. availability of programs.

L 28. The single most important value of free materials is that they

a. have low cost.
b. have ready availability.
c. complement learnings.
d. correlate with learnings.

T 29. Film guides for teachers are usually supplied by film producers for the purpose of (select one wrong answer)

a. advertising and promoting the film.
b. helping the user or potential user to know about the film contents in some depth without previewing.
c. suggesting possible techniques and procedures for getting the most out of the film.
d. all of the above are correct.

T 30. Which one of the following sources provides the least amount of subject matter in the form of free materials.

a. United States Government.
b. United Nations.
c. Embassies of foreign countries.
d. United States industrial concerns.

L 31. Student-made posters should be all but one of the following

a. forceful and clear in treatment.
b. have one main purpose resulting in a uniform poster style.
c. large enough to be easily seen.
d. be concerned with a topic which the student is studying.

L 32. Which of the following is most false?

a. graphs show numerical relationships.
b. charts show verbal relationships.
c. diagrams show time and experience relationships.
d. posters show relationships verbally and pictorially.

L 33. The chief value of graphics is that (one incorrect answer)

a. they are easy to make and to store.
b. they are easy to read and to interpret.
c. they are easy to use to depict aural-visual data.
d. they are easy to use to depict statistical data.

T 34. Which statement is the most important pedagogically speaking

a. there are hundreds of graphics and displays available.
b. all graphics may be produced locally or purchased commercially.
c. the best graphics combine color, pictures and verbal content.
d. the best graphics are those involving student manipulation and/or creation.

L 35. Many "2x2" slide projectors may also accommodate which one

a. 16mm film.
b. 35mm filmstrips.
c. opaque materials.
d. translucent materials.

L 36. A zoom lens is desirable on a projector because (select one wrong)

a. it gives a sharp, clear picture.
b. it permits projecting a bright picture without the noise of a cooling fan.
c. it permits adjusting picture size on the screen without moving the projector.
d. it permits using the projector with any size film.

L 37. When using the Kodak Carousel slide projector, in order to advance the slide you (select one best answer)

a. use the remote changer.
b. set the automatic timed sequence changer.
c. use the manual changer on the side of the projector.
d. all of the above are correct.

L 38. "2x2" color slides are produced on

a. 8mm film.
b. 24mm film.
c. 35mm film.
d. 16mm film.

T 39. The best method of using a majority of available filmstrips is

a. integrated with other materials.
b. as the main focal point of the unit.
c. as the culminating activity.
d. as an introduction for motivation.

L 40. Which of the following is not normally used in an opaque projector

a. flat pictures.
b. three-dimensional objects.
c. lantern slides or transparencies.
d. printed maps.

L 41. To locate the power cord on the Kodak Carousel slide projector

a. open the storage compartment on top of the projector.
b. open the storage compartment on the bottom of the projector.
c. look in the carrying case and remove it.
d. look in the space under the control buttons.

L 42. The chief limitation of the filmstrip as a medium of instruction is

a. its fixed sequence of pictures.
b. its relatively high purchase cost.
c. its difficulty in storing and cataloging.
d. the lack of variety in available subjects.

L 43. Transparencies made for use on the overhead projector differ from "2x2" color slides and "2¼x3¼" slides by which one of

a. the use of color.
b. the use of printed text.
c. the use of overlays.
d. the use of acetate sheets.

L 44. The least usable for writing on overhead transparencies is

a. chart pak pen.
b. ball point pen.
c. felt pen.
d. grease pencil.

L 45. One of the following processes will not make suitable transparencies for overhead projection

a. infra-red film.
b. anscochrome film.
c. diazo film.
d. color-lift.

L 46. One of the following is not a good quality of overhead projectives

a. harmony and balance in design.
b. parsimony in pictures and captions.
c. neat drawings and legible lettering.
d. details depicted with many colors.

L 47. The film loop is usually used with (select one wrong answer)

a. small groups or for self-instruction
b. large groups on a super-8mm projector.
c. independent study for audio-visual previewing and viewing.
d. other learning materials and activities.

L 48. When showing a film, if you have not anticipated vocabulary problems or concept barriers after careful planning you should

a. discuss it the next day.
b. interrupt the film showing.
c. speak louder than the film.
d. let it pass.

L 49. An element that can be omitted from any projector without disturbing its picture-projecting function is

a. a lens.
b. materials holder.
c. tilt mechanism.
d. light source.

T 50. Most often the 16mm films which a teacher uses are ordered from

a. the school district IMC.
b. the department in which the teacher teaches.
c. a film rental agency.
d. commercial purchases.

T 51. Select one of the following practices that will insure the proper selection of replacement projection lamps.

a. use a lamp of the same size and shape as that in the machine.
b. use any lamp that produces a satisfactory screen image.
c. use any lamp that will fit the machine lamp-receptable.
d. use only a lamp specified by the machine manufacturer.

L 52. If part of another picture appears on the top or bottom of the screen, the operator should correct the situation by

a. turning the elevating mechanism.
b. turning the lens in or out.
c. turning the framing knob.
d. stopping the projector and threading it properly.

L 53. The reason we always elevate and prefocus before threading is

a. to assure that the picture will fit the screen and be about in focus.
b. to be sure that projection is on the screen.
c. to be sure that the picture and sound will be synchronized.
d. all of the above are correct.

L 54. The picture will probably flutter on the screen and may result in damaged sprocket holes if

a. the top loop is missing.
b. the bottom loop is missing.
c. both top and bottom loops are missing.
d. all of the above are correct.

L 55. On the Bell and Howell Autoload which is on your table, for automatic threading the autoload lever must be put in the autoload position. The lever is located at

a. position 1.
b. position 2.
c. position 3.
d. position 4.

L 56. On the same projector, the sound drum is located at

a. position 5.
b. position 6.
c. position 7.
d. position 8.

L 57. The advantage of using a patch cord instead of a microphone when copying a tape or record, or when recording a radio or TV program is (select the best answer).

a. extraneous sounds do not interfere.
b. the quality is better.
c. copying another tape can be done in complete silence.
d. all of the above are correct.

T 58. The key to using commercial, radio, television and film in the classroom is

a. getting the program log well in advance.
b. previewing the production in advance.
c. arranging through live or video tape showing to have pupils see it.
d. discussing the production.

L 59. It is possible to record on tape from a radio, TV, videotape or record player by (select one wrong answer)

a. live taping while the original broadcast is being made.
b. by using a patch cord to marry the tape recorder through the external jacks to other electronic devices.
c. only b provides usable tape recordings.
d. by placing the tape recorder microphone near the other device as the broadcast is being made.

T 60. Instructional television (ITV) differs from educational television (ETV) primarily because

a. ITV is received over open rather than closed circuit.
b. production quality of ITV is inferior to ETV.
c. ITV is planned as part of a specific program of study.
d. teachers are not permitted to teach over ETV.

T 61. Homebound students may actively participate in a regularly scheduled class by which one (most effective)

a. telewriting.
b. telelecture.
c. television.
d. telephone.

L 62. Of the following editing procedures, which one is false

a. we can add magnetic tape sound to a film.
b. we can add film to a film, add sound to it, take away film or take away sound from it.
c. we can add film to a tape, or take tape away from a film.
d. we can add magnetic sound to a tape, and take away sound by cutting out portions.

T 63. The most frequent and common, though not necessarily the best use of tape recorders is

a. in the elementary school classroom.
b. in speech and hearing therapy.
c. to record speeches, lectures, panels, etc. for social science classes.
d. in language laboratories.

L 64. The following steps are necessary in making a tape recording (select one wrong answer)

a. set up and plug in.
b. load full reel on right spindle and thread.
c. set volume and tone on middle range.
d. press record button and test modulating needle or light.

L 65. By "dubbing" a tape we mean (select most correct answer)

a. erasing an unusable portion.
b. adding a different recording to a segment.
c. a plus b.
d. none of these.

T 66. Which of the following statements is not true

a. 70% of the average adults' day is spent in verbal communication with 45% used for listening.
b. we write at 25 words per minute, speak at 100-150 and read and think at 300.
c. children retain 20 to 30% of what they hear but adults retain 50%.
d. 60% of the time in high school classes and 80% in college classes is devoted to listening acts.

L 67. The highest quality tape recording of a radio program can be made by which of the following arrangements

a. radio to microphone to tape recorder.
b. radio to disk to tape recorder.
c. radio to tape recorder line input via patchcoard.
d. all are of equal recording fidelity.

T 68. After a delay of two days or two weeks it was found that college students engaged in listening only retained

a. 90 percent.
b. 75 percent.
c. 50 percent.
d. 25 percent.

L 69. The one chief value of real things is

a. they are easily obtained.
b. they are accurate.
c. they are easy to use in the classroom.
d. they are easily stored.

L 70. In selecting and using maps and globes the teacher must consider all but one of the following:

a. size and legibility.
b. detail and simplicity.
c. color symbolism.
d. comprehensiveness.

T 71. Which one of the following is least correct.

a. the problem with maps is that it is difficult to use a flat surface in order to depict a globular area.
b. the problem with maps is their lack of accurate representation.
c. the problem with maps is that it is almost impossible to teach map reading skills.
d. the problem with maps is that the individual accustomed to dealing with small areas has difficulty visualizing large areas.

T 72. Mock-ups are usually used to do all but which one of the following

a. show cross-sections.
b. simplify reality.
c. provide an inexpensive simulation of a real thing.
d. highlight essential parts or functions.

T 73. Some easy to use community resource techniques are (wrong one)

a. parent-student town hall type lessons.
b. field trips and school picnic.
c. resource speakers.
d. surveys.

T 74. Which of the following is not a recommended teacher procedure in connection with taking field trips

a. make a preview visit to obtain preliminary information and to inform the host agency of class needs and interests.
b. obtain written permission slips from each parent.
c. if the trip concludes after school hours, return all students directly to their homes.
d. spend classroom time in pre-field trip pupil-teacher planning.

T 75. In taking a field trip which one statement below is false?

a. field trips preferably are taken after school or on Saturday.
b. students obtain written parental permission to attend.
c. field trips come as a developmental or culminating activity.
d. students and teacher jointly plan and execute the trip.

T 76. Bulletin boards (select wrong one)

a. facilitate class study of single copy materials.
b. motivate and stimulate student interest.
c. save time since we don't have to discuss the content.
d. provide reviews or can be used for tests.

L 77. The least useful display boards are (select one)

a. wall board.
b. cork board.
c. masonite board.
d. peg board.

L 78. Which of the following statements is true.

a. the best way to show a diagram is on the chalkboard.
b. the best use of bulletin boards is to have students make the display.
c. the best use of peg boards is to hang pictures.
d. the best use of flannel boards is to display student work.

T 79. The one chief value of collections is (one best answer)

a. student learns of the vast varieties of things.
b. student learns patience and perseverance in learning.
c. student learns to collect and to classify objects.
d. student learns to generalize main ideas from ideas gained in studying the collection.

L 80. The least accurate and attractive method of placing drawings on the chalkboard is

a. using a template.
b. using an overhead projector.
c. using wooden drawing instruments.
d. using a drawing grid.

L 81. In lettering it is best to use letters which are (select one wrong)

a. of a size and spacing which makes for easy reading.
b. ornate and attractive.
c. colorful and motivational.
d. be harmonious with the rest of the display.

T 82. It may be said of bulletin boards (select one wrong answer)

a. there should be about equal balance between bulletin and chalkboard space.
b. they should be in the front of the room.
c. they are preferably of cork or similar material.
d. they should be neat, attractive and preferably colorful.

T 83. Creativity: (select one wrong answer)

a. cannot be taught by a teacher but can be stimulated or stifled by the methods teachers use.
b. cannot be taught by traditional teaching materials but may be stimulated or stifled by the kinds of materials used.
c. cannot be taught by programmed materials but may be stimulated or stifled by the kind of programs used.
d. all of the above are correct.

T 84. The most easily used creative experiences for a class are (one wrong answer)

a. dramatic productions.
b. making things.
c. role playing.
d. art work.

T 85. Which one of the following objectives of creative experiences is least valuable

a. students gain interaction.
b. students learn methods and media.
c. students learn to express themselves.
d. students learn to communicate.

T 86. The chief psychological value of creative work is (all are correct, but select the best answer)

a. allows student expression.
b. gives student recognition.
c. trains students to create.
d. motivates students.

L 87. Again, which of the following is not a major advantage of opaque photographic prints.

a. they help the reader to interpret ideas and to remember.
b. they compress information.
c. they are two-dimensional.
d. they are easily stored and indexed.

T 88. The best use of photography which may be made in the classroom is

a. producing photographs as a record.
b. producing educational films.
c. learning ideas through visual means.
d. learning to plan, script and produce and edit film stories.

T 89. The very best way to use a news picture in class is

a. pass the picture around the class.
b. project the picture in an opascope.
c. use a color-lift to make an overhead transparency.
d. mount and display the picture on the wall.

T 90. In experiments, the key objective is gained by students during which of the following phases

a. demonstration.
b. explanation.
c. review
d. experimentation.

T 91. The best demonstration technique of a complex process is

a. demonstrate the whole process and students then practice.
b. demonstrate parts, then students practice.
c. demonstrate parts, student practices part, demonstrate next part, students practice it, then demonstrate and practice whole.
d. demonstrate and practice whole, then practice parts, then whole.

L 92. Almost all the learning resources used in this course are (select one wrong answer)

a. colorful and artistic.
b. motivational.
c. entertaining rather than factual.
d. available in most public schools.

T 93. The teacher in the new educational setting has been described as a transactional agent. This means that

a. the teacher digests material and presents it to the student.
b. the teacher selects material and presents it to the student.
c. the teacher acts to facilitate the students' encounters with appropriate learning resources.
d. the teacher directs the student in his encounter with learning resources.

T 94. Twyford estimates that as of July 1, 1969, public schools in the United States owned the following numbers of items (one wrong answer)

a. 187,000 TV receivers.
b. 4,200,000 darkened rooms.
c. 251,000 16mm motion picture projectors.
d. 576,000 ear phones.

T 95. The computer in its most creative application to education is being used for

a. record keeping and scheduling.
b. tutoring and testing.
c. simulation and gaming.
d. information retrieval.

T 96. The recent use of academic games in education has been based on

a. students like to play games and can learn from them.
b. research indicating the superiority of academic games over other forms of learning exists.
c. experiments at the Turtle Creek Schools.
d. availability of academic games.

T 97. A major thrust of current educational effort is toward

a. reducing the unit cost of instruction.
b. finding ways to adapt educational programs to the needs and abilities of individual learners.
c. building more self-contained classrooms.
d. finding ways to replace teachers with technological devices.

L 98. Which one of the following steps comes first in student learning via an experiment

a. demonstration.
b. explanation.
c. review.
d. experimentation.

T 99. The computer project involving adaptive assignments based on students' previous work completion, achievement and other related factors is known as

a. PLAN.
b. PLATO.
c. The Suppes Program.
d. ERE.

T 100. Which one of the following does not reflect the situation between education and communication today.

a. increasing individualization of instruction.
b. increasing use of new media for instruction.
c. increasing stratification of the curriculum.
d. increasing attention to teacher education on media and curriculum.

Attitude Toward Use of Media

Name _____ Major _____ Date_____

SSN _____ Minor(if any) _____ Score ____/2 = ____%

Based on what you now know about Media (both hardware and software) and their usage, please indicate what your attitude is toward your intended future use of the following. Place an X in the appropriate space of the scale at the right of the page. Answer all items. Be frank, but accurate. This is not a graded exercise.

	Of no use to me	Know nothing about it	Not relevant to me but of value to others	Of some use to me.	Excellent: Plan to use it a great deal	Essential: will use it almost daily
1. A model for communications						
2. Knowledge of how children learn						
3. A theory of instruction						
4. Classification of major learning activities						
5. Behavioral objectives						
6. Taxonomy of educational objectives						
7. Selection of media plan						
8. A lesson plan						
9. Systematic instruction						
10. Instructional technology						
11. The overhead projector						
12. Diazo and infra-red processes						
13. Filmstrip projector						
14. Slide projector						
15. Opaque projector						
16. Rear screen projectors						

	Of no use to me	Know nothing about it	Not relevant to me but of value to others	Of some use to me	Excellent: Plan to use it a great deal	Essential: Will use it almost daily
17. 16mm Motion picture projector						
18. Film loops						
19. Graphics--posters, charts, etc.						
20. Photographs and pictures						
21. Radio						
22. Instructional Television						
23. Tape recorders						
24. Record players, listening centers						
25. Instructional materials center						
26. The library						
27. Dial-access-and-retrieval						
28. Centralized source of materials						
29. Programmed instruction						
30. Computer-assisted-instruction						
31. Text and reference books						
32. Free and supplementary materials						
33. Demonstrations						
34. Experiences						
35. Boards--chalk, cork, magnetic, etc.						
36. Diaplays and exhibits.						
37. Community resources						
38. Creative learning experiences						
39. The use of color						
40. Motivational techniques						
41. Multi-media instruction						
42. Multi-channel communication						
43. Lecture-recitation methods						
44. Audio-visual methods						
45. Teacher-centered classes						
46. Learner-centered classes						
47. Evaluative criteria						
48. Acquisition plans and procedures						
49. What media research says (learning)						
50. What media research says (of teaching)						
Tally each column times this value	-1	0	1	2	3	4

Welliver Reports[1]

Achievement Test: Form A

1. The definitions of the content areas to be measured by this test have been examined and are considered appropriate for a pre-service course in instructional media for teachers.
2. The categories of the content areas to be measured by this test have been examined and appear to be a comprehensive representation of the knowledge of instructional media required of pre-service teachers.
3. The items in this test have been carefully examined and appear to appropriately represent, in quality and number, the categories of the content to a sufficient degree to discriminate between students who possess the required knowledge and students who do not.

Achievement Test: Form B

1. The definitions of the content areas to be measured by this test have been examined and are considered appropriate for a pre-service course in instructional media for teachers.
2. The categories of the content areas to be measured by this test have been examined and appear to be a comprehensive representation of the knowledge of instructional media required of pre-service teachers.
3. The items in this test have been carefully examined and appear to appropriately represent, in quality and number, the categories of

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[1]Welliver, Paul W., Report on Content Validity, Unpublished Report, University Park, Pa.: College of Education, The Pennsylvania State University, 1971.

the content to a sufficient degree to discriminate between students who possess the required knowledge and students who do not.

Attitude Test:

1. The definitions of the content areas considered in this test have been examined and are appropriate for a pre-service course in instructional media for teachers.
2. The categories of the content areas considered in this test have been examined and are a comprehensive representation of the knowledge of instructional media required of pre-service teachers.
3. The items in this test have been carefully examined and have been found to represent all categories of the content and provide a comprehensive list for determining student attitude toward the usefulness of each factor in teaching.

s/ paul w. welliver

T/ Paul W. Welliver
Assistant Professor of Education
Pennsylvania State University

Zoppetti Report[2]

In my judgement, the achievement tests measure student achievement of course objectives in an Introductory Course in Audio-Visual Material and Methods. Content validity in both forms of the achievement test is achieved by categorizing the major areas found in an Introductory Course in Educational Media. Additionally, the statistics indicate that the tests contain a sufficient number of discriminatory items. The reliability coefficients obtained indicate that Form A and Form B are equivalent.

The Attitude Test, in my judgement, measures teacher attitude toward the intended use of theory, media, materials and method.

s/ matthew zoppetti

T/ Matthew Zoppetti
Associate Professor of Education
Department of Educational
Studies and Services
Bloomsburg State College

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[2]Zoppetti, Matthew, Report on Content Validity, Unpublished Report, Bloomsburg, Pa.: Department of Educational Studies and Services, Bloomsburg State College, 1971.

APPENDIX C

IMPLEMENTATION OF TEACHING METHODS

Table 21. Inter-observer Reliability, Scott's pi, Control Tape 5

Cat.	Difference and Average Percentages for Observers											
	A vs. B		A vs. C		A vs. D		B vs. C		B vs. D		C vs. D	
	Diff	Ave	Diff	Ave	Diff	Ave	Diff	Ave	Diff	Ave	Diff	Ave
1												
2	.53	.00	.00	.00	.24	.00	.53	.00	.29	.00	.24	.00
3	.32	.15	2.99	.06	3.00	.06	2.67	.54	2.68	.05	.01	.01
4	2.48	.16	1.48	.12	1.68	.13	1.00	2.23	.80	.23	.20	.19
5	1.26	27.93	.37	28.80	4.26	30.92	1.63	28.13	5.52	30.23	3.89	31.13
6	2.79	7.00	1.06	7.47	1.57	7.33	1.73	6.73	1.22	6.59	.51	7.05
7	1.43	.09	6.95	.33	4.40	.20	5.52	.41	2.97	.26	2.55	.62
8												
9	.36	.05	.50	.03	.27	.03	.86	.37	.63	.04	.23	.03
10	.41	.53	4.23	.29	5.74	.21	3.82	2.64	5.33	.19	1.51	.06
Tot.	9.58	35.91	17.58	37.10	21.16	38.88	17.76	41.05	19.44	37.59	9.14	39.09
pi	.85		.72		.65		.70		.69		.85	

Table 22. Control and Experimental Group Totals and Means Compared

Cat.	Total Scores		Mean Tally per cat.		Mean % per Category	
	Control	Experimen.	Control	Experimen.	Control	Experimen.
1		1		.08		.02
2	110	154	.80	12.83	.19	3.16
3	85	839	7.08	69.91	1.75	17.21
4	91	1358	7.58	113.16	1.87	27.87
5	2211	804	184.25	66.16	45.60	16.53
6	1729	120	155.08	10.00	35.66	2.46
7	130	12	10.83	1.16	2.67	1.28
8	249	2	20.75	.16	5.12	.03
9	104	1566	8.66	130.50	2.14	32.14
10	237	21	19.75	1.75	4.88	.43
Total	4846	4877	403.75	406.41	99.88	100.10

Table 23. Categorization of Control Group Verbal Behavior

Category	1	2	3	4	5	6	7	8	9	10	Total
Tape C-1											
Inst. A* #			2	3	273	101	13		5	5	402
%			.50	.75	67.91	25.12	3.23		1.24	1.24	99.99
Stud. B** #		1		4	259	94	32		5	4	399
%		.25		1.00	64.91	23.56	8.02		1.25	1.00	100.00
Tape C-3											
Inst. A #				10	151	208	1			29	399
%				2.51	37.84	52.13	.25			7.27	100.00
Stud. B #			3	8	141	212	7		25	25	398
%			.75	2.01	35.43	53.27	1.76		.50	6.28	100.00
Tape C-5											
Inst. A #		1	16	11	215	112	9		8	30	402
%		.25	3.98	2.74	53.48	27.86	2.23		1.99	7.46	99.99
Stud. B #		3	14	20	200	96	14		9	27	383
%		.78	3.66	5.22	52.22	25.07	3.66		2.35	7.05	100.01
Tape C-2											
Inst. C #		1	2	7	85	182	3	128	2	18	428
%		.23	.47	1.64	19.86	42.52	.70	29.91	.47	4.21	100.01
Stud. D #		1	2	7	83	175	3	120	2	21	414
%		.24	.48	1.69	20.05	42.27	.72	28.99	.48	5.07	99.99
Tape C-4											
Inst. C #				3	106	272				31	412
%				.73	25.73	66.02				7.52	100.00
Stud. D #				2	103	276				26	407
%				.49	25.31	67.81				6.39	100.00
Tape C-6											
Inst. C #			23	7	292	1	28		36	13	400
%			5.75	1.75	73.00	.25	7.00		9.00	3.25	100.00
Stud. D #		3	23	9	303		20		35	8	401
%		.75	5.74	2.24	75.56		4.99		8.73	1.99	100.00

* Instructor
** Student

Table 24. Categorization of Experimental Group Verbal Behavior

Category	1	2	3	4	5	6	7	8	9	10	Total
Tape E-1											
Inst. A #	1	7	79	137	90	25			64	1	404
%	.25	1.73	19.55	33.91	22.28	6.19			15.84	.25	100.00
Stud. B #		16	73	140	85	23	3		70	1	411
%		3.89	17.76	34.06	20.68	5.60	.73		17.03	.24	99.99
Tape E-3											
Inst. A #		17	75	157	52	2	1		94		398
%		4.27	18.84	39.45	13.07	.50	.25		23.62		100.00
Stud. B #		10	62	158	57	2	6		103	1	399
%		2.51	15.54	39.60	14.29	.50	1.50		25.81	.25	100.00
Tape E-5											
Inst. A #		12	138	148	28	2		2	67	2	399
%		3.01	34.59	37.09	7.02	.50		.50	16.79	.50	100.00
Stud. B #		10	126	134	33	6			82	6	397
%		2.52	31.74	33.75	8.31	1.51			20.65	1.51	100.00
Tape E-2											
Inst. C #		9	4	30	11	24	1		334	2	415
%		2.17	.96	7.23	2.65	5.78	.24		80.48	.48	11.99
Stud. D #		6	4	24	9	26	1		336	1	407
%		1.47	.98	5.90	2.21	6.39	.25		82.56	.25	100.01
Tape E-4											
Inst. C #		20	93	98	91	2			100	2	406
%		4.93	22.91	24.14	22.41	.49			24.63	.49	100.00
Stud. D #		19	78	93	97	3			113	3	406
%		4.68	19.21	22.91	23.89	.74			27.83	.74	100.00
Tape E-6											
Inst. C #		14	62	121	120	2			105	1	425
%		3.29	14.58	28.47	28.24	.47			24.71	.24	100.00
Stud. D #		14	45	118	131	3			98	1	410
%		3.41	10.98	28.78	31.95	.73			23.90	.24	99.99

Table 25. Control-Presentation versus Experimental-Behavioral Ratios

Item Tape	Obsv.	Control $\frac{5,6,7}{1,2,3,4} = X_c$ $\triangleright 1.00 \triangleright$	Experimental $\frac{5,6,7}{1,2,3,4} = X_e$ $\triangleleft 1.00$	H_1: $C > 1 > E < 1$
1	A	387/ 5 = 77.40 $\triangleright$ 1.00 $\triangleright$	115/224 = .513 $\triangleleft$ 1.00	Accept**
1	B	385/ 5 = 77.00 $\triangleright$ 1.00 $\triangleright$	111/229 = .484 $\triangleleft$ 1.00	Accept**
3	A	360/10 = 36.00 $\triangleright$ 1.00 $\triangleright$	55/249 = .230 $\triangleleft$ 1.00	Accept**
3	B	360/11 = 32.727 $\triangleright$ 1.00 $\triangleright$	65/230 = .282 $\triangleleft$ 1.00	Accept**
5	A	336/28 = 12.00 $\triangleright$ 1.00 $\triangleright$	30/298 = .100 $\triangleleft$ 1.00	Accept**
5	B	310/37 = 8.378 $\triangleright$ 1.00 $\triangleright$	39/270 = .144 $\triangleleft$ 1.00	Accept**
2	C	270/10 = 27.00 $\triangleright$ 1.00 $\triangleright$	36/43 = .837 $\triangleleft$ 1.00	Accept**
2	D	261/10 = 26.10 $\triangleright$ 1.00 $\triangleright$	36/34 = 1.058 $\not\triangleleft$ 1.00	Reject
4	C	378/3 = 126.00 $\triangleright$ 1.00 $\triangleright$	93/211 = .440 $\triangleleft$ 1.00	Accept**
4	D	379/2 = 189.50 $\triangleright$ 1.00 $\triangleright$	100/190 = .526 $\triangleleft$ 1.00	Accept**
6	C	321/30 = 10.70 $\triangleright$ 1.00 $\triangleright$	122/197 = .619 $\triangleleft$ 1.00	Accept**
6	D	323/35 = 9.228 $\triangleright$ 1.00 $\triangleright$	134/177 = .757 $\triangleleft$ 1.00	Accept**
Sum		632.073	5.996	
n		12	12	
Mean		52.672 $\triangleright$ 1.00 $\triangleright$	.499 $\triangleleft$ 1.00	Accept
$(\text{Sum } x)^2$		399,516.477	35.952	
$(\text{Sum } x)^2/n$		33,293.039	2.996	
$\text{Sum } x^2$		67,897.156	3.908	
SS		34,604.110	.912	34,605.022
df		11	11	22
s^2				262.159
F p				10.382**

**p < .05 $F_{.95}(1,22) = 4.30$

Table 26. Control-Stimulus versus Experimental-Response Ratios

Item Tape	Obsv.	Control $8,9/5,6,7=X_c$	$\lessgtr .25$	Experimental $8,9/5,6,7=X_e$	$\lessgtr .25$	H_1: $C<.25<E>.25$
1	A	5/387 = .013	<	64/115 = .556	>	Accept**
1	B	5/385 = .013	<	70/111 = .630	>	Accept**
3	A	0/360 = .000	<	94/55 = 1.709	>	Accept**
3	B	2/360 = .005	<	103/65 = 1.584	>	Accept**
5	A	8/336 = .023	<	69/30 = 2.300	>	Accept**
5	B	9/310 = .029	<	82/39 = 2.102	>	Accept**
2	C	130/270 = .481	<	334/36 = 9.277	>	Accept**
2	D	122/261 = .475	<	336/36 = 9.333	>	Accept**
4	C	0/378 = .000	<	100/93 = 1.075	>	Accept**
4	D	0/379 = .000	<	113/100 = 1.130	>	Accept**
6	C	36/321 = .112	<	105/122 = .860	>	Accept**
6	D	35/323 = .108	<	98/134 = .731	>	Accept**
Sum		1.259		31.287		
n		12		12		
Mean		.104	<	2.607	>	
$(\text{Sum } x)^2$		1.585		978.876		
$(\text{Sum } x)^2/n$		.132		81.573		
$\text{Sum } x^2$		.483		193.058		
SS		.351		111.485		111.836
df		11		11		22
s^2_p						5.083
F						7.37**

**p < .05

$F_{.95}(1,22) = 4.30$

Table 27. Control-Group versus Experimental-Individual Ratios

Item Tape	Obsv.	Control 9/Total=X_c		Experimental 9/Total = X_e		H_1: $C^1 < .15 < E > .15$
1	A	5/402 = .012	< .15 <	64/404 = .158	> .15	Accept**
1	B	5/399 = .012	< .15 <	70/411 = .170	> .15	Accept**
3	A	0/399 = .000	< .15 <	94/398 = .236	> .15	Accept**
3	B	2/398 = .010	< .15 <	103/399 = .258	> .15	Accept**
5	A	8/402 = .019	< .15 <	67/399 = .168	> .15	Accept**
5	B	9/383 = .023	< .15 <	82/397 = .206	> .15	Accept**
2	C	2/428 = .004	< .15 <	334/415 = .804	> .15	Accept**
2	D	2/414 = .004	< .15 <	336/407 = .825	> .15	Accept**
4	C	0/412 = .000	< .15 <	100/406 = .246	> .15	Accept**
4	D	0/407 = .000	< .15 <	113/406 = .278	> .15	Accept**
6	C	36/400 = .090	< .15 <	105/425= .247	> .15	Accept**
6	D	35/401 = .081	< .15 <	98/410= .239	> .15	Accept**
Sum		.261		3.835		
n		12		12		
Mean		.021	< .15 <	.319	> .15	
(Sum x)^2		.068		14.707		
(Sum x)^2/n		.005		1.225		
Sum x^2		.016		1.829		
SS		.011		.604		.615
df		11		11		22
s^2						.028
F p						9.515**

**p < .05 $F_{.95}(1,22) = 4.30$

Table 28. Control-Passive versus Experimental-Active Ratios

Item Tape	Obsv.	Control 8,9/Total = X_c	$\lessgtr .15$	Experimental 8,9/Total = X_e	$\gtrless .15$	H_1: C<.15<E>.15
1	A	5/402 = .012	<.15 <	64/404 = .158	> .15	Accept**
1	B	5/309 = .012	<.15 <	70/411 = .170	> .15	Accept**
3	A	0/399 = .000	<.15 <	94/398 = .236	> .15	Accept**
3	B	2/398 = .010	<.15 <	103/399 = .258	> .15	Accept**
5	A	8/402 = .019	<.15 <	69/399 = .173	> .15	Accept**
5	B	9/383 = .023	<.15 <	82/397 = .206	> .15	Accept**
2	C	130/428 = .303	<.15 <	334/415 = .804	> .15	Reject
2	D	122/414 = .294	<.15 <	336/407 = .825	> .15	Reject
4	C	0/412 = .000	<.15 <	100/406 = .246	> .15	Accept**
4	D	0/407 = .000	<.15 <	113/406 = .278	> .15	Accept**
6	C	36/400 = .090	<.15 <	105/425 = .247	> .15	Accept**
6	D	35/401 = .087	<.15 <	98/410 = .239	> .15	Accept**
Sum x		.850		3.840		
n		12		12		
Mean		.070	<.15 <	.320	> .15	
$(\text{Sum } x)^2$		.722		14.745		
$(\text{Sum } x)^2/n$		.060		1.228		
Sum x^2		.187		.183		
SS		.126		1.172		1.298
df		11		11		22
s^2_p						.053
F						7.15**

**p <.05 $\quad F_{.95}(1,22) = 4.30$

Supplementary Report to Flanders System

In your opinion which one of each of the five pairs of statements best describes what occurred during the lesson which you have just observed. Place a check mark in the appropriate space. In addition make any comments which you care to add.

1. With respect to the concept of instruction employed, the instructor:

_____ a. emphasized the use of various media (projectors, recorders, materials, etc) as aids to instruction and was preoccupied with effects of these devices and procedures.

_____ b. emphasized learner behavior and response and used media to enhance learner behaving and responding.

2. The emphasis /as shown by the methods used/ was on:

_____ a. instruction, instructional media and instructional procedures.

_____ b. the learner, learning, learning activities and learning procedures.

3. The instructor appeared to be seeking to

_____ a. deal with the total group most of the time.

_____ b. deal with individuals most of the time.

4. During the lesson the instructor stressed

_____ a. the presentation of the lesson content via lecture and media.

_____ b. learner response behavior with little or no lecturing.

5. The student activity apparently was

_____ a. passive except for note taking and occasional responses to direct questions.

_____ b. actively responding to instructor questions, volunteering his own ideas and asking questions.

COMMENTS

Table 29. Supplementary Report on Control Group Instruction

Tape	Observer	Items and Alternate Responses									
		1a	1b	2a	2b	3a	3b	4a	4b	5a	5b
C-1	A	x		x		x		x		x	
	B	x		x		x		x		x	
C-3	A	x		x		x		x		x	
	B	x		x		x		x		x	
C-5	A	x		x		x		x		x	
	B	x		x		x		x		x	
C-2	C	x			x	x			x		x
	D		x		x		x		x		x
C-4	C	x		x		x		x		x	
	D	x		x		x		x		x	
C-6	C	x		x		x		x		x	
	D	x		x		x		x		x	

96.67% Agreement

Table 30. Supplementary Report on Experimental Group Instruction

Tape	Observer	Items and Alternate Responses									
		1a	1b	2a	2b	3a	3b	4a	4b	5a	5b
E-1	A		x		x		x		x		x
	B		x		x		x		x		x
E-3	A		x		x		x		x		x
	B		x		x		x		x		x
E-5	A		x		x		x		x		x
	B		x		x		x		x		x
E-2	C		x		x		x		x		x
	D		x		x		x		x		x
E-4	C		x		x		x		x		x
	D		x		x		x		x		x
E-6	C		x		x		x		x		x
	D		x		x		x		x		x

100% Agreement

Overall agreement, both groups = 98.33%

APPENDIX D

RAW DATA AND TESTS OF ASSUMPTIONS FOR ALL THE HYPOTHESES

Table 31. Achievement Test, Raw Total Scores, n = 15, k = 6.

Samples of Teaching Majors												
A_1 Natural Science-Mathematics				A_2 Humanities				A_3 Social Sciences			
B_1 Control Group		B_2 Experimental Group		B_1 Control Group		B_2 Experimental Group		B_1 Control Group		B_2 Experimental Group	
X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
51	71	42	64	49	62	46	66	41	64	53	59
33	57	48	64	47	67	59	62	39	62	46	61
47	68	39	65	37	60	42	59	53	65	45	57
47	73	53	72	34	60	53	63	45	67	56	74
44	76	48	57	44	62	56	70	56	62	40	63
45	59	51	54	30	57	53	60	43	57	57	73
36	61	39	58	42	61	51	76	51	53	45	66
44	46	48	58	48	67	42	63	47	47	55	69
47	70	44	57	50	65	49	59	51	74	44	69
46	53	42	71	47	64	56	62	47	66	55	65
42	63	51	59	38	51	47	62	47	66	48	68
46	61	48	54	45	60	50	65	52	60	42	62
53	67	49	65	47	67	47	64	44	62	49	65
56	75	44	69	37	48	62	68	54	68	49	62
33	59	37	51	48	58	52	58	47	67	37	61
Σ x 670	959	683	918	643	909	765	957	717	940	721	974
$\bar{x}$ 44.666	63.933	45.533	61.200	42.866	60.600	51.000	63.800	47.800	62.666	48.067	64.933
s 6.618	8.531	4.926	6.471	6.186	5.539	5.781	4.753	4.945	6.564	5.146	4.934

The Cochran Test, largest variance divided by the sum of variances, was used to test for homogeneity of variances. The C observed for all 12 variances is .166. The Critical Value for this test with 12 and 14 degrees of freedom is .197. The observed value does not exceed this figure. The variances are homogeneous.

Values of S are: S_1 = 2,743.412; S_2 = 113.022; S_3 = 131.768; and S_4 = -.543. These data are used to test the following assumptions:

That the between-class regression is linear: F=S_3/k-2//MS' error-131.768/4//34.416 = .957, observed. The critical value for F at the .05 level of significance with 4 and 83 degrees of freedom is 2.50. The observed value does not exceed the critical value. The assumption may be made.

That between-class regression equals the within class regression: F = S_4/MS'error = -.543/34.416 = -.015. The critical value of F is $F_{.95}$ (1,83) = 3.97. The assumption may be made.

That the within-class regression is homogeneous: For this test F = S_2/(k-1) // S_1/ k(n-2) = 113.022/5//2743.512/78 = .642. The critical value is $F_{.95}$ (5,78) = 2.35. The assumption may be made.

That the overall regression is linear: F = (S_2 + S_3 + S_4)/ 2(k-1) // S_1/ K(n-2) = (113.023 + 131.768 - .543)/10//2743.41/78 = .694. The critical value is $F_{.95}$ (10,78) = 1.97. The observed value does not exceed the critical value. The assumption may be made. The following assumptions may also be made: (1) the residuals are normally and independently distributed with zero means and the same variance, and (2) the proper form of the regression equation has been fitted.

Table 32. Achievement Test, Raw Textbook Scores, $n = 15$, $k = 6$.

Samples of Teaching Majors												
A_1 Natural Science-Mathematics				A_2 Humanities				A_3 Social Sciences			
B_1 Control Group		B_2 Experimental Group		B_1 Control Group		B_2 Experimental Group		B_1 Control Group		B_2 Experimental Group	
X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
23	34	18	33	27	26	25	31	17	24	25	25
19	25	21	30	22	27	28	28	27	24	21	33
28	36	21	34	17	29	16	27	22	32	21	29
22	31	31	37	15	25	29	31	20	29	26	36
19	33	24	25	21	33	27	32	27	28	17	30
25	29	11	25	17	27	25	23	18	27	28	34
18	27	22	26	21	28	26	40	26	22	24	33
22	16	26	30	27	30	25	26	21	20	31	32
21	33	21	25	30	30	26	28	24	37	24	30
25	24	22	33	27	31	28	32	25	33	27	28
20	27	21	21	18	22	25	27	21	32	26	30
23	30	25	25	19	27	25	28	24	26	22	24
28	31	18	29	23	33	24	30	22	25	26	33
29	32	22	30	16	20	30	34	25	32	20	30
18	26	19	24	27	30	27	26	22	33	15	30
Σx 340	434	322	427	327	418	386	443	341	424	353	457
$\bar{x}$ 22.666	28.933	21.466	28.466	21.800	27.866	25.733	29.533	22.733	28.266	23.533	30.466
s 3.677	5.006	4.406	4.486	4.828	3.662	3.195	4.086	3.058	4.817	4.240	3.226

Tests of Assumptions

The Cochran Test was used to test the homogeneity of variances. The observed value was .123. The critical value is $C_{.95}$ (12,14) = .197. The observed value does not exceed the critical value. The assumption may be made.

The Values of S are: S_1 = 1283.943; S_2 = 86.326; S_3 = 14.651; and, S_4 = -.368. These values were used to make the following tests:

That the between-class regression is linear: F = S_3/k-2//MS' error = .221. The critical value is $F_{.95}$ (4,83) = 2.50. The observed value is less than the critical value. The assumption may be made.

That the between-class regression equals the within class regression: F = S_4/MS'error = -.022. The critical value is $F_{.95}$(1,83) = 3.97. The observed value is less than the critical value. The assumption may be made.

That the within-class regression is homogeneous: The test is F = S_2/(pq-1)//S_1/pq(n-2) = .882. The critical value is $F_{.95}$(5,78) = 2.35. The observed value is less than the critical value. The assumption may be made.

That the overall regression is linear: F=(S_2+S_3+S_4)/2(k-1)// S_1/k(n-2) = .514. The critical value is $F_{.95}$(10.78) = 1.97. The observed value is less than the critical value. The assumptions may be made. The following assumptions are also made: (1) the residuals are normally and independently distributed with zero means and the same variance, and (2) the proper form of the regression equation has been fitted.

Table 33. Achievement Test, Raw Laboratory Scores, $n = 15$, $k = 6$.

Samples of Teaching Majors												
A_1 Natural Science-Mathematics				A_2 Humanities				A_3 Social Sciences			
B_1 Control Group		B_2 Experimental Group		B_1 Control Group		B_2 Experimental Group		B_1 Control Group		B_2 Experimental Group	
X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
28	37	24	31	22	36	21	35	24	40	28	34
14	32	27	34	25	40	31	34	12	38	25	28
19	32	18	31	20	31	26	32	31	33	24	28
25	43	22	35	19	35	24	32	25	38	30	38
25	43	24	32	23	29	29	38	29	34	23	33
20	30	40	29	13	30	28	37	25	30	29	39
18	34	17	32	21	33	25	36	25	31	21	33
22	30	22	28	21	37	17	37	26	27	24	27
26	37	23	32	20	35	23	31	27	37	20	39
21	29	20	38	20	33	28	30	22	33	28	37
22	36	30	38	20	29	22	35	26	34	22	38
23	31	23	29	26	33	25	37	28	34	20	38
25	36	31	36	24	34	23	34	22	37	23	32
27	43	22	39	21	28	32	34	29	36	29	32
15	33	18	27	21	28	25	32	25	34	22	31
Σx 330	526	361	491	316	491	379	514	376	516	368	507
$\bar{x}$ 22.000	35.066	24.066	32.733	21.066	32.733	25.266	34.266	25.066	34.400	24.533	33.800
s 4.209	4.832	5.981	3.807	3.011	3.555	3.936	2.463	4.399	3.418	3.441	4.195

Tests of Assumptions

The the variances are homogeneous. The Cochran Test was used. The observed value of C = largest variance divided by the sum of variances was equal to .183. The critical value for this test is $C_{.95}$ (12,14) = .197. The observed value for this test is $C_{.95}$ (12,14) = .197. The observed value was less than the critical value. The assumption may be made.

The values of S are: S_1 = 1041.613; S_2 = 137.337; S_3 = 53.619; S_4 = 2.816. The following assumptions were tested with these values.

That the between-class regression is linear: F = S_3/k-2//MS' error = .943. The critical value is $F_{.95}$ (4,83) = 2.50. The observed value is less than the critical value. The assumption may be made.

That the between-class regression equals the within-class regression: F = S_4/MS'error = .198. The critical value is $F_{.95}$ (1,83) = 3.97. The observed value is less than the critical value. The assumption may be made.

That the within-class regression is homogeneous: The test is F = S_2/pq-1//S_1/pq(n-2) = 2.50. The critical value is $F_{.95}$(4,83) = 2.50. The observed value is less than the critical value. The assumption may be made.

That the overall regression is linear: F = (S_2 + S_3 + S_4)/2(k-1) //S_1/k(n-2) = 1.451. The critical value is $F_{.95}$(10,78) = 1.97. The observed value is less than the critical value. The following assumptions may be made: (1) the overall regression is linear, (2) the residuals are normally and independently distributed with zero means and the same variance, and (3) the proper form of regression equation has been fitted.

Table 34. Attitude Test, Raw Scores

Samples of Teaching Majors												
A_1 Natural Science-Mathematics				A_2 Humanities				A_3 Social Sciences			
B_1 Control Group		B_2 Experimental Group		B_1 Control Group		B_2 Experimental Group		B_1 Control Group		B_2 Experimental Group	
X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
47.5	72.5	37.0	65.0	31.0	55.5	71.5	74.0	44.0	57.0	46.0	71.5
70.5	74.0	53.0	73.0	54.5	60.5	57.5	77.5	45.5	64.5	68.0	74.0
39.5	72.0	27.0	58.0	46.5	45.0	41.5	60.5	49.0	65.0	59.0	73.0
40.5	53.5	55.5	65.5	42.0	69.5	47.0	66.5	59.5	71.0	68.5	64.5
47.0	58.0	48.0	81.0	55.5	53.0	60.5	69.5	56.0	86.0	49.0	71.5
58.0	56.0	60.5	75.5	39.5	48.0	55.0	62.5	61.0	64.5	54.5	72.5
47.5	70.5	55.0	64.5	60.5	70.5	45.0	77.5	59.5	74.5	52.0	64.5
55.5	62.0	45.5	66.0	44.0	61.5	37.0	67.5	42.0	78.5	73.0	76.5
54.5	66.0	61.0	73.5	51.5	59.0	47.5	58.5	36.5	62.5	40.5	50.0
35.0	47.0	42.5	66.5	35.5	64.0	57.0	79.0	50.5	65.0	54.5	79.5
50.0	55.0	50.5	71.0	56.5	69.5	52.5	77.5	41.5	44.5	42.5	70.5
57.0	51.5	64.0	69.5	46.0	72.0	46.5	70.5	45.0	64.5	69.5	83.5
45.5	63.0	57.5	82.0	48.5	65.0	50.0	51.0	62.0	67.0	40.5	65.5
22.5	60.5	52.5	70.5	38.5	82.5	62.0	64.5	55.0	60.5	70.5	69.5
32.5	39.5	46.5	68.5	62.5	72.0	67.0	73.5	53.00	50.5	33.0	52.0
Σx 703.0	901.0	756.0	1050.0	712.5	947.5	797.5	1030.0	760.0	975.5	821.0	1038.5
$\bar{x}$ 46.866	60.066	50.400	70.000	47.500	63.166	53.166	68.666	50.666	65.033	54.733	69.233
s 11.851	10.016	9.793	6.370	9.304	10.062	9.581	8.196	8.061	10.265	12.895	9.051

Tests of Assumptions

That the variances are homogeneous: The Cochran test was used. It is C = variance largest/sum of variances = .159. The critical value for this test is $C_{.95}(12,14)$ = .197. The observed value is less than the critical value. The assumption may be made.

The values of S are: S_1 = 5954.453; S_2 = 30.592; S_3 = 363.124; and, S_4 = 357.187. These values are used for the following tests:

That the between-class regression is linear: The test has the form: $F = S_3/k\text{-}2//MS'$ error = 1.258. The critical value is $F_{.95}(4,83)$ = 2.50. The observed value is less than the critical value. The assumption may be made.

That the between-class regression equals the within-class regression: $F = S_4/MS'$error = 4.953. The critical value is $F_{.95}(1,83)$ = 3.97. The observed value clearly exceeds the critical value. But this is the effect which is being tested. See findings of the analysis of co-variance.

That the within-class regression is homogeneous. This test is $F = S_2/pq\text{-}1//S_1/pq(n-2)$ = .080. The critical value is $F_{.95}(5,78)$ = 2.35. The observed value is less than the critical value. The assumption may be made.

That the overall regression is linear. This test has the form: $F = (S_2 + S_3 + S_4)/2(k\text{-}1)//S_1/k(n-2)$ = .983. The critical value is $F_{.95}(10,78)$ = 1.97. The observed value is less than the critical value. The following assumptions may be made: (1) the overall regression is linear, (2) residuals are normally and independently distributed with zero means and the same variance, and (3) the proper form of regression equation has been fitted.

Table 35. Adjusted Treatment Means

	a_1		a_2		a_3	
	b_1	b_2	b_1	b_2	b_1	b_2
$\bar{X}_j$	46.866	50.400	47.500	53.166	50.666	54.7333
$\bar{X}_j - \bar{X}$	-3.789	- .155	-3.055	2.611	.111	4.178
$\bar{Y}_j$	60.066	70.00	63.166	68.666	65.033	69.233
$\bar{Y}'_j = \bar{Y}_j - b(\bar{X}_j - \bar{X})$	61.300	70.505	64.161	67.815	64.997	67.872

F-test of Difference between Means

This test takes the form

$$F = \frac{(\bar{Y}'_{j1} - \bar{Y}'_{j2})^2}{MS'_{error}\left(\left(\frac{2}{n} + \frac{(X_{j1} - X_{j2})^2}{E_{xx}}\right)\right)}$$

Table 36. Values of F for Comparisons of Adjusted Treatment Means

	Nat. Sci.-Math.		Humanities		Social Science	
	Control	Experi.	Control	Experi.	Control	Experi.
Nat. Sci.-Math. Control		8.73**	.84	4.29**	1.39	4.27**
Nat. Sci.-Math. Experimental				.27		.71
Humanities Control		4.13**		1.35	.07	2.31
Social Science Control		3.16		.80		.85
Social Science Experimental						

**$p < .05$ $\quad F_{.95}(1,83) = 3.97$

Table 37. Values, Raw Scores, Control Group, C_1

Samples of Teaching Majors									
A_1 Natural Science-Mathematics			A_2 Humanities			A_3 Social Science		
B_1 theor.	B_2 aesth.	B_3 polit.	B_1 theor.	B_2 aesth.	B_3 polit.	B_1 theor.	B_2 aesth.	B_3 polit.
40	40	38	34	44	35	50	20	47
41	40	39	38	51	40	35	44	42
41	49	46	27	53	39	31	35	49
53	47	32	33	49	28	35	46	54
48	26	44	32	47	28	31	43	54
28	36	45	39	57	39	31	45	49
39	42	44	26	38	37	36	41	52
46	43	44	31	43	41	35	31	44
42	42	27	32	52	38	23	50	46
50	32	47	33	52	37	36	41	49
47	26	47	31	34	51	22	40	46
41	26	40	30	44	33	29	41	50
41	40	36	28	44	31	38	38	49
38	45	40	34	53	41	34	45	48
45	47	47	43	61	36	35	47	49
Σx 640	581	616	491	722	554	501	607	728
$\bar{x}$ 42.666	38.733	41.066	32.733	48.133	36.933	33.406	40.466	48.533
s 5.936	7.860	5.934	4.558	7.130	5.762	6.522	7.415	3.314

Table 38. Values, Raw Scores, Experimental Group, C_2

Samples of Teaching Majors								
A_1 Natural Science-Mathematics			A_2 Humanities			A_3 Social Science		
B_1 theor.	B_2 aesth.	B_3 polit.	B_1 theor.	B_2 aesth.	B_3 polit.	B_1 theor.	B_2 aesth.	B_3 polit.
34	41	39	36	45	31	29	48	53
46	48	32	38	49	31	43	43	41
40	35	34	27	51	35	35	39	44
48	26	43	42	53	33	36	37	49
35	27	45	44	57	34	45	31	43
43	42	32	28	50	34	41	44	28
51	22	52	34	44	39	41	34	55
41	39	46	49	45	44	26	37	53
46	35	36	39	51	38	42	37	48
56	49	50	30	37	42	29	38	45
40	29	51	32	44	51	40	40	32
52	25	42	52	48	35	32	46	29
49	40	41	34	52	35	35	29	44
64	31	33	41	52	47	32	33	42
49	49	33	42	50	32	38	40	49
$\underline{x}$ 694	538	609	568	728	561	544	576	655
$\bar{x}$ 46.266	35.866	40.600	37.866	48.533	37.333	36.266	38.400	43.666
s 7.914	9.031	7.139	7.328	4.868	6.068	5.775	5.383	8.397

Table 39. Study of Values, Sample versus Population Means Compared

			Sample		Population				H_1 Decision	Comment: Level of Significance
			$\bar{x}$	s_x	Weighted Mean	S.D.	$\bar{x}-\mu$	$s_{obsv.}$		
b_1	a_1	c_1	42.66	6.23	38.32	7.34	4.339	2.286	Reject	.015
		c_2	46.26	7.91			7.933	4.179	Reject	.00005
	a_2	c_1	32.73	4.60			-5.594	-2.947	Accept	n.s.d.
		c_2	37.86	7.32			- .461	- .242	Accept	n.s.d.
	a_3	c_1	33.40	6.52			-4.927	-2.596	Accept	n.s.d.
		c_2	36.26	5.77			-2.067	-1.094	Accept	n.s.d.
b_2	a_1	c_1	38.73	7.86	40.22	8.49	-1.494	- .736	Accept	n.s.d.
		c_2	35.86	9.03			-4.361	-1.87	Accept	n.s.d.
	a_2	c_1	48.13	7.13			7.906	4.294	Reject	.00005
		c_2	48.53	4.86			8.306	6.608	Reject	.0000005
	a_3	c_1	40.46	7.41			.239	.124	Accept	n.s.d.
		c_2	38.40	5.38			-1.827	-1.314	Accept	n.s.d.
b_3	a_1	c_1	41.06	5.93	39.48	6.64	1.583	1.03	Accept	n.s.d.
		c_2	40.60	5.93			1.117	.729	Accept	n.s.d.
	a_2	c_1	36.93	6.48			-2.55	-1.522	Accept	n.s.d.
		c_2	37.40	8.60			-2.083	- .937	Accept	n.s.d.
	a_3	c_1	48.53	3.31			9.05	4.074	Reject	.00005
		c_2	43.66	8.52			4.177	1.898	Reject	.03

n.s.d. Not significantly different at the .05 level of significance.

$H_1 : \bar{x} = \mu$ $\quad$ $H_2 : \bar{x} > \mu$

$P(z_{obsv.} > 1.645 \quad H_1 \text{ true}) = .05$ With the decision rule: Reject H_1 when $z_{obsv.}$ is greater than 1.645. Do not reject H_1 otherwise.

Test of thc Assumption that Variances are homogeneous. The Cochran Test was used. It has the form: largest variance divided by the sum of the variances.

For hypothesis 3, theoretical values, the observed value of C was .252. The critical value for this test is $C_{.95}(6,14) = .331$. The observed value is less than the critical value. The assumption may be made.

For hypothesis 4, aesthetic values, the observed value was .270. This was less than the critical value, $C_{.95}(6,14) = .331$. The assumption may be made.

For hypothesis 5, political values, the observed value was .296. This was less than the critical value, $C_{.95}(6,14) = .331$. The assumption may be made.

When all samples are combined C = .103. The critical value for 18 samples is $C_{.95}(18,14) = .127$. The observed value is less than the critical value. The assumption that variances are homogeneous may be made.

Table 40. Study of Values, Weighting of National Norms

Type of n's	Theoretical	Aesthetic	Political
2,489 males	43.75	35.09	42.94
1,289 females	35.75	42.67	37.84
Combined	39.75	38.88	40.39
Weighted Means*	38.32	40.22	39.48

*Scores on the values tests differ by sex. Norms are based on a ratio of 2 males to 1 female, while the experimental groups took the opposite ratio. In the control group there were 13 males and 32 females. The treatment group had 16 males and 29 females. Combined there were 29 males, or 32.22 percent, and 61 females, or 67.78 percent. Weighted theoretical values were obtained by calculating 32.22% of the male norms and 67.78% of the female, and adding results to obtain 38.32.

Table 41. Correlations Related to Hypotheses 6, 7, 8 and 9

Samples	Control Group					Experimental Group			
	Tests X and Y	X	Y	ΣXY	r	X	Y	ΣXY	r
Nat. Sci. (n = 15)	Total-Atti.	939	901	57,838	.195	918	1050	64.122	-.239
	Total-theor.	959	640	40.933	.022	918	694	42.695	.309
	Cogni-Psych.	434	529	15.486	.788*	427	491	14.028	.212
	Cogni-Atti.	434	901	26.251	.259	427	1050	29.697	.481
	Cogni-theor.	424	640	18.431	-.207	427	694	19.799	.086
	Psych.-Atti.	526	901	31,640	.067	491	1050	34.424	.160
	Psych.-theor.	526	640	22.555	.279	491	694	22.896	.424
	Atti.-theor.	901	640	39.153	-.348	1050	694	48.554	-.036
Humanities (n = 15)	Total-Atti.	909	947	57.094	-.415	957	1030	65.855	.260
	Total-aesth.	909	722	43.739	-.025	959	728	46.440	-.019
	Cogni-Psych.	418	491	13.723	.222	443	514	15.175	-.036
	Cogni.-Atti.	418	947	26.165	-.463	443	1030	30.208	-.449
	Cogni.-aesth.	418	722	20.177	/156	443	728	21.528	.099
	Psych.-Atti.	491	947	30.929	-.171	514	1030	35.313	.066
	Psych.-aesth.	491	722	23.635	.004	514	728	24.977	.183
	Atti.-aesth.	947	722	45.420	-.185	1030	728	49.653	-.602*
Soc. Sci. (n = 15)	Total-Atti.	940	975	60.649	-.511*	974	1038	67.326	-.171
	Total-polit.	940	728	45.639	.058	974	655	42.466	-.112
	Cogni.-Psych.	424	516	14.643	.248	457	507	15.433	-.071
	Cogni.-Atti.	424	975	27.249	-.468	457	1038	31.506	-.325
	Cogni.-polit.	424	728	20.598	.088	457	655	20.009	.146
	Psych.-Atti.	516	975	33.399	-.321	507	1038	35.123	.040
	Psych.-polit.	516	728	25.041	-.013	507	655	22.080	-.119
	Atti.-polit.	975	728	47.533	.396	1038	655	44.906	-.414

(continued)

Table 41. Correlations Related to Hypotheses 6, 7, 8 and 9 (continued)

Samples	Control Group					Experimental Group			
	Tests X and Y	X	Y	ΣXY	r	X	Y	ΣXY	r
Samples Combined (n = 45)	Total-Atti.	2808	2824	175.581	-.205	2849	3118	197.303	-.069
	Total-theor.	2808	1632	101.887	.022	2849	1806	114.407	.033
	Total-aesth.	2808	1910	119.247	.024	2849	1842	116.745	.060
	Total-polit.	2808	1898	118.083	-.164	2849	1825	115.640	.052
	Cogni.-Psych.	1276	1533	43.852	.486**	1327	1512	44.636	.078
	Cogni.-Atti.	1276	2824	79.665	-.207	1327	3118	91.412	-.405**
	Cogni.-theor.	1276	1632	46.019	-.181	1327	1806	53.157	-.069
	Cogni.-aesth.	1276	1910	54.441	.171	1327	1842	54.371	.035
	Cogni.-polit.	1276	1898	53.555	-.192	1327	1825	53.752	-.049
	Psych.-Atti.	1533	2824	95.969	-.131	1612	3118	104.861	.065
	Psych.-theor.	1533	1632	55.921	.253	1512	1806	60.815	.104
	Psych.-aesth.	1533	1910	64.926	-.095	1512	1842	61.923	.023
	Psych.-polit.	1533	1898	64.560	-.079	1512	1825	61.345	.021
	Atti.-theor.	2824	1632	101.890	.163	3118	1806	124.949	-.073
	Atti.-aesth.	2824	1910	119.779	.022	3118	1842	127.443	-.070
	Atti.-polit.	2824	1898	119.350	.077	3118	1825	126.095	-.145

*$r_{.95}$ (n = 15, df = 13) = .51

**$r_{.95}$ (n = 45, df = 43) = .29

APPENDIX E

RAW DATA AND STATISTICS FOR THE PILOT STUDY

Table 42. Six Value Schema, Raw Scores, Pilot Study

Teaching Major	Group	n	Study of Values Sub-test Raw Scores											
			Theoretical		Economic		Aesthetic		Social		Political		Religious	
			Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mathematics	Con.	9	43.22	46.67	35.00	37.56	39.67	39.78	43.44	39.11	42.11	41.56	36.56	35.33
	Exp.	9	40.00	40.56	39.33	38.22	29.78	44.00	46.44	43.56	40.11	39.89	34.33	33.78
Bio.,Chem.,	Con.	1	55.00	57.00	44.00	40.00	36.00	32.00	35.00	38.00	30.00	43.00	40.00	30.00
Physics	Exp.	6	45.00	44.33	39.17	37.67	36.00	38.50	35.17	38.17	41.33	39.50	48.33	41.83
Art	Con.	8	39.00	34.88	34.88	35.00	54.38	55.50	38.75	40.63	32.75	30.63	43.63	43.38
	Exp.	3	37.75	38.00	36.33	32.00	49.63	49.00	37.33	43.66	42.00	39.67	35.67	37.67
Music	Con.	4	37.75	32.25	37.00	53.00	54.75	41.25	43.25	33.75	36.50	37.25	37.75	37.75
	Exp.	5	40.20	32.80	37.80	48.00	48.20	38.40	39.80	32.60	35.00	43.00	40.00	44.00
English and	Con.	12	38.67	35.67	40.58	40.33	42.17	40.67	44.25	48.00	37.58	39.25	36.75	36.08
Languages	Exp.	7	37.14	35.43	36.14	33.43	46.28	49.86	43.71	44.86	39.86	42.29	36.86	34.14
Social	Con.	6	36.00	35.83	35.50	35.83	43.83	41.00	40.83	42.33	44.50	47.83	39.33	37.17
Sciences	Exp.	6	38.17	38.33	40.83	38.83	39.67	38.33	44.67	44.50	49.00	52.50	27.67	27.50
Elementary	Con.	13	36.62	35.77	37.85	40.23	30.85	38.62	43.85	45.54	40.69	39.92	41.14	39.93
	Exp.	23	35.13	34.70	39.26	40.17	41.04	41.83	45.65	45.30	39.52	39.44	39.39	38.57
Home	Con	5	34.60	34.00	36.60	45.20	39.40	41.40	49.40	47.80	40.80	37.20	39.20	34.40
Economics	Exp.	13	32.85	34.23	38.39	42.69	42.77	43.38	42.92	42.62	38.15	38.08	44.92	39.00
Business	Con.	4	34.25	36.00	47.00	49.00	36.00	31.75	42.25	43.30	42.75	43.75	37.75	36.75
	Exp.	4	32.25	32.75	48.25	47.75	36.25	37.50	41.00	43.25	45.50	43.00	36.75	35.75

Table 43. Raw Scores, Attitude and Achievement, Pilot Study

Teaching Major	Group	n	Attitude		Achievement	
			Pre	Post	Pre	Post
Mathematics	Control	9	66.11	66.11	54.11	69.44
	Experimental	9	70.67	63.78	50.11	63.00
Biology, Chem., Phys.	Control	1	79.00	77.00	56.00	65.00
	Experimental	6	64.32	62.67	52.33	68.17
Art	Control	8	70.25	67.63	49.88	61.13
	Experimental	3	56.67	63.00	47.33	64.00
Music	Control	4	63.00	61.25	52.75	66.50
	Experimental	5	57.60	66.20	50.00	67.80
English, Languages	Control	12	64.33	68.67	51.67	63.83
	Experimental	7	69.00	69.43	52.29	66.57
Social Science	Control	6	71.17	75.00	52.67	64.83
	Experimental	6	72.33	70.00	48.50	63.00
Elementary Education	Control	13	68.85	69.69	51.62	67.00
	Experimental	23	71.39	70.52	51.13	67.86
Home Economics	Control	5	61.20	61.00	53.40	69.80
	Experimental	13	67.62	68.00	49.93	63.39
Business	Control	4	68.00	68.50	55.25	66.75
	Experimental	4	66.50	67.25	56.75	69.50

Table 44. Summary of F from Analysis of Co-Variance

Item	Source			$r_{w.cell}$	Error
	A Majors	B Groups	Interaction		
df	2	1	2		23
Critical Value $F_{.95}$	3.42	4.28	3.42		
Theoretical	5.574**	2.719	.16	.792	
Aesthetic	6.680**	5.067**	3.17	.768	
Political	15.782**	31.573**	1.71	.620	
Attitudes	2.54	2.660	1.41	.576	
Achievement	1.476	1.236	1.71	.384	

**$p < .05$, $F_{.95}(2,23) = 3.42$ $r_{w.cell}(df=3) = .878$
$F_{.95}(1,23) = 4.28$

Table 45. Summary, 3 Majors, 3 Values, 2 Groups, Analysis of Co-Variance, Pilot Study

	Tests		Natural Science-Math. (n=5)				Humanities (n = 5)				Social Science (n = 5)			
			Experiment.		Control		Experiment.		Control		Experiment.		Control	
			Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
(n = 5)	Theoretical Values	Pre	40.60	8.48	43.00	6.92	40.20	3.25	42.60	6.09	35.20	8.08	37.80	2.72
		Post	41.00	6.20	48.00	7.16	35.40	2.42	38.60	8.33	34.20	6.40	39.20	4.62
	Attitude Score	Pre	66.80	10.31	74.20	6.24	48.20	7.25	71.00	12.54	72.20	13.23	68.40	6.50
		Post	60.40	4.63	74.60	6.53	65.60	7.16	60.80	9.58	75.20	7.70	79.00	15.68
	Achievement Test	Pre	53.40	7.39	53.60	4.03	53.00	4.38	49.80	4.83	43.80	7.36	53.80	4.92
		Post	66.40	4.08	67.80	4.49	65.80	4.79	65.00	1.67	67.60	5.68	69.40	7.71
(n = 5)	Aesthetic Values	Pre	40.00	11.88	35.80	6.05	46.40	4.84	48.20	4.96	37.00	5.18	40.40	9.60
		Post	48.60	8.66	31.20	4.02	48.40	9.75	47.20	7.39	37.20	4.91	39.20	8.21
	Attitude Score	Pre	69.40	7.58	65.20	4.83	66.60	6.41	67.20	12.21	64.80	11.99	73.00	9.12
		Post	60.60	5.85	67.80	6.94	69.40	6.08	69.20	11.53	61.80	12.02	70.60	10.19
	Achievement Test	Pre	55.80	12.72	56.20	7.22	45.20	9.60	46.60	2.94	52.40	3.50	52.00	2.61
		Post	65.80	10.73	69.80	4.58	67.80	5.00	58.80	3.66	63.40	4.75	66.80	5.08
(n = 5)	Political Values	Pre	41.60	2.33	42.00	4.07	41.40	2.94	33.80	6.15	39.20	6.34	40.20	2.56
		Post	39.40	3.50	39.00	9.06	40.00	3.80	34.40	4.59	39.80	4.71	42.60	6.92
	Attitude Score	Pre	68.80	6.94	65.20	6.01	59.40	9.85	58.60	12.48	75.00	7.70	65.00	4.52
		Post	72.80	8.21	62.60	13.11	66.20	6.85	65.40	11.66	71.[illegible]	11.86	76.80	9.39
	Achievement Test	Pre	50.80	2.40	52.20	4.80	54.40	5.04	55.80	6.88	48.80	7.91	53.20	2.71
		Post	70.20	4.53	66.40	4.27	65.80	2.04	63.00	6.10	64.00	4.90	63.60	4.36

A Comparison of Performance versus Presentation Based Methods of Instructing Pre-Service Teachers in Media Competencies

by

Daniel V. Mattox, Jr.

An Abstract of a Thesis

in

Secondary Education

Submitted in partial fulfillment
of the requirements
for the degree of

Doctor of Philosophy

The Pennsylvania State University
The Graduate School
Division of Academic Curriculum and Instruction

The effectiveness of conventional versus experimental methods of instruction as administered to two randomly selected groups of preservice teachers enrolled in a first course in media competencies was examined. Conventional methods were defined, arbitrarily, as presentation, stimulus-control and group instruction oriented. They used heterogeneous grouping and were based on a physical science concept of instruction. Conversely, experimental methods were performance-based, used response-shaping instructor verbal behavior and were oriented to the individual learner. Homogeneous grouping was employed, and methods were based on the behavioral science concept of instruction.

Sampled subjects were categorized on the basis of each subject's major field into Natural Science-Mathematics, Humanities, and Social Science pools. Equal-sized samples, n = 15, were randomly drawn from these pools for each group. Instructors were assigned to groups by random lottery. A pretest-posttest control group design was used.

A fifty item attitude scale, and two forms of an achievement test, each containing fifty textbook and fifty laboratory-learning items were developed and validated for measuring learner performances. Subjects' values were measured by the Allport-Vernon-Lindzey Study of Values for the purpose of determining relationships between subjects' performances and teaching majors. Classroom interaction analysis, Flander's system, was used to determine whether methods were appropriately implemented, and if they differed.

A series of hypotheses were developed to affirm or deny the significance of instructional treatments under specific classroom conditions. Those hypotheses found to be statistically significant

revealed that:

1. The experimental treatment was superior to conventional instruction in inducing attitude change.

2. The evidence confirmed the theory that teaching majors hold value schema, as follows: Natural Science-Mathematics subjects score highest in theoretical values; Humanities in aesthetic values; and, Social Sciences in political values.

3. Correlations between textbook and attitude scores, and between textbook and laboratory scores for the control group Natural Science-Mathematics sample were significantly higher than that of the related experimental group sample.

Of those hypotheses found not to be significant, the most interesting data with respect to this study were those that implied that:

1. Across diverse samples of teaching majors, treatment induced homogeneous results, while conventional instruction provided heterogeneous results.

2. Values scores correlate at low positive to negative levels with achievement and attitude scores.

3. Attitude and Achievement scores correlate at low positive to high negative levels.

4. Conventional instruction provides higher positive correlations between textbook scores and other correlates, while treatment provides higher correlations between laboratory scores and other correlates.

5. Treatment, which used almost no textbook presentation rationale, was equally effective in inducing textbook learning as conventional instruction which used this mode almost exclusively.

From the tentative data derived from this very limited study, the following implications seem tenable:

1. Treatment is distinctive from and is at least as valid as conventional instruction in a first course in media.

2. Since treatment excelled or equalled conventional instruction in most cases, it merits further examination to include revisions toward making it the clearly superior method.

3. Conventional instruction may neglect some teaching majors while favoring the Natural Science-Mathematics subjects through use of the Physical Science concept of instruction.

4. The textbook emphasis of conventional instruction may not be as effective as implied by its users.

5. The low correlations between values and other scores, suggests that this variable should no longer be used in such studies as this.

VITA

Daniel Valentine Mattox, Jr. was born February 13, 1922 near Uniontown (Fayette County), Pennsylvania. He graduated in June 1940 from Perry Township High School, Perryopolis, Penna. His college graduations include: The Pennsylvania State College, August 5, 1943, Bachelor of Science with a major in Physical Sciences (Secondary Education); The Pennsylvania State University, June 11, 1955, Master of Education in Secondary Education, and; The University of Colorado, August 25, 1958, Professional Certificate in Counseling and Guidance.

He has been employed as an Associate Professor of Education at the Indiana University of Pennsylvania, Indiana, Pa., September 1969 to date; a Graduate Assistant, College of Education, The Pennsylvania State University, 1968 to 1969; Associate Professor. Mississippi State College for Women, Columbus, Miss., 1962 to 1968; Assistant Professor, University of Tennessee, Martin, Tenn., 1961-1962; public school administrator, Pratt County, Kansas, 1959 to 1961; Assistant Professor, Park College, Parkville, Mo., 1957 to 1959; and Guidance Counselor, Fairbanks, Ak., 1955 to 1957. From 1942 to 1954 he was in the United States Army with ranks from Private to Captain, Regular Army.

He is Book Review Editor of Audiovisual Instruction and has contributed to several other journals. He is a member of the American Educational Research Association, National Education Association, and related other national, state and local education associations. He is in Who's Who in American Education and the Dictionary of International Biography. He is a member of Phi Delta Kappa, Iota Alpha Delta, Kappa Phi Kappa and Alpha Zeta honoraries.